Netværk for kvinder i fysik

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Kære netværksmedlemmer!

Årets sidste nyhedsbrev bringer nyt fra bestyrelsen, annoncering af et KIF gå-i-byen møde hos NKT Research, referat af generalforsamlingen ved KIF årsmødet 2001, en efterlysning af deltagere til IUPAPs internationale konference om kvinder i fysik, samt det danske indlæg til denne, referat fra et hollandsk symposium for kvinder i fysik, som Kirstine Berg-Sørensen deltog i som inviteret foredragsholder, samt endnu en opfordring til medlemmerne om at bidrage med indlæg til KIF ekspertdatabasen.

Som sædvanlig har vi også diverse udklip: Vi bringer teksten fra en tale af Prof. Ursula Franklin fra konferencen *More than just numbers, on women and engineering*, med titlen "Looking forward, looking back", en diskussion af forholdene for kvindelige ingeniører i Canada med udgangspunkt i mordene på 14 kvindelige studerende ved L'ecole polytechnique i Montréal, 6 dec. 1989. Herefter følger endnu en tale med titlen "Changing Roles for Women in Research Universities", af Heidi Newberg, givet ved *American Physical Society Meeting*, der omhandler en serie af tankevækkende episoder som taleren har oplevet gennem sin karriere som fysiker, i sin egenskab af at være kvinde. Den næste artikel har titlen "What you don't know can hurt you: Illogical dimensions to being a woman scientist", af Kristy Dyer, fra *STATUS: A report on women in Astronomy*, om modsætningsforholdet mellem de videnskabelige idealer i fysikken og de spørgsmål vi bliver nødt til at stille hvis kvinder skal have bedre vilkår som fysikere. Så kommer lidt statistik, en oversigt over andelen af kvinder i undervisning ved de højere læreanstalter og i offentlig forskning i Europa: "Women hold less than one third of posts in higher education teaching and public research" fra *Eurostat News Release*, samt highlights og udvalgte grafer fra en rapport om Kvinder i fysik i USA: "Women in Physics, 2000", *AIP report*. Så kommer en artikel om Birgitta Nordström fra *www.astro.su.se/sas/popast/Birgitta.html*. Herefter har vi en artikel om den nyudnævnte kvindelige professor i fysik, den første af slagsen i Danmark, Dorthe Dahl-Jensen, med titlen "Detektiv på Grønlandsisen", fra *Forum*. Til slut kommer en omtale af et web-site med en oversigt over "Contributions of 20th century women to physics".

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Nyt fra bestyrelsen

I forbindelse med den tidligere KIF bestyrelsesformand, Anja Andersens, tilbagevenden til Danmark i sommeren 2001, havde en evt. rekonstituering af bestyrelsen været på tale. På bestyrelsesmødet d. 7/9 2001 blev det dog besluttet at den nuværende bestyrelse, med Eva Danielsen som KIF formand, fortsætter perioden ud, dvs. indtil januar 2002, hvor den på årsmødet valgte kommende bestyrelse konstitueres. – Se referatet af generalforsamlingen for en oversigt over denne. Oplysninger om den nuværende bestyrelse kan findes på KIFs hjemmeside: http://www.nbi.dk/kif.

Med udgangspunkt i spørgeskemaundersøgelsen blandt medlemmerne har bestyrelsen besluttet at forsøge at afholde KIF årsmødet på en lørdag. Dette bliver gjort i håbet om at det vil medføre et større fremmøde, idet en del af KIFs medlemmer, pga. arbejde, har været forhindret i at deltage i de tidligere årsmøder, der altid har ligget på hverdage. I år 2002 afholdes KIF årsmødet lørdag d. 1. juni, i forlængelse af Dansk Fysisk Selskabs årsmøde d. 30-31. maj. Årsmødet vil som sædvanligt starte kl. 10. Bestyrelsen vil allerede nu opfordre medlemmerne til at indsende forslag til foredragsholdere til årsmødet. Disse forslag skal helst være bestyrelsen i hænde ved udgangen af januar.

KIF bestyrelsen vil gerne annoncere endnu et KIF gå-i-byen-møde. Denne gang i form af et besøg ved NKT Research i Lyngby, hvor Britt Hvolbæk Larsen vil give os en guided tour. Se nærmere beskrivelse nedenfor.

Medlemmerne opfordres også til at indsende bidrag til nyhedsbrevet. Finder du en relevant artikel et sted, så send os en kopi, har du lyst til at skrive om en dag i dit liv, så

send os et "En dag i en kvindelig fysikers liv"-indlæg, eller har du bare nogle kommentarer til KIF eller til situationen for kvinder i fysik i Danmark, så fat pennen. Bidrag kan overleveres til et bestyrelsesmedlem efter eget valg, eller sendes til de nyhedsbrevsansvarlige, der for tiden er: Liv Hornekær og Ling Miao, Fysisk Institut, Syddansk Universitet – Odense, Campusvej 55, 5230 Odense M.

Endelig vil KIF bestyrelsen gerne sige tillykke til Dorthe Dahl-Jensen, der fornylig, som den første kvinde i Danmark, blev udnævnt til professor i fysik.

Gå-i-byen møde hos NKT Research.

v. Britt Hvolbæk Larsen

For et halvt år siden blev jeg ansat i fotonik gruppen hos NKT Research og Innovation. Vi arbejder med at udvikle integreret optik. Populært sagt udvikler vi en teknologi som skal gøre det muligt at lave en optisk chip, hvor vi kan lede lys rundt og bearbejde det. Vi benytter os af strukturer, som kaldes fotoniske båndgabs materialer, hvori lys med visse bølgelængder ikke kan eksistere. Disse mikrostrukturer fremstilles på MIC, DTU.

NKT koncernen har igennem en årrække skabt en række højteknologiske selskaber. Mest kendt er nok selskaberne inden for optisk kommunikation så som Giga (nu Intel), Ionas, Cisilias og Crystal Fibre. Men også inden for bioteknologi er flere nye firmaer blevet startet, så som SMB og Cantion. Dette er i tråd med NKTs strategi om på lang sigt at satse på områderne fotonik og lifescience.

NKT Research og Innovation består som navnet antyder af to dele. I Research forskes i teknologi, som kan komme datterselskaberne til gode, eller hvorfra nye selskaber kan dannes. I Innovation arbejder forretningsudviklere, som ud fra en ide til et nyt selskab kan undersøge markedet, lave en forretningsplan og bidrage med venture kapital. De kan således hjælpe en ide fra skrivebordet til opstartsfirma.

Ud over NKT Research og Innovation har NKT sammen med COM centeret dannet NKT Academy, en organisation som hvert år uddeler 12 Ph.D. stipendier inden for fotonik og lifescience. NKT investerer penge i dette bl.a. ud fra en overvejelse om, at basal forskning inden for disse emner vil gavne NKTs strategi på lang sigt.

På Gå-i-byen mødet vil jeg fortælle kort om NKT generelt, lidt om hvordan det er at være ansat i en privat virksomhed, og mere om videnskaben i det jeg arbejder med til daglig. En af mine kollegaer, Lars Kildemark Nielsen vil fortælle om hvad lifescience gruppen laver. Der bliver en rundvisning omkring det rene rum på MIC med forklaring om generel mikroprocessering, og måske et kig i et optisk laboratorium.

Vi starter kl 17:00 d. 24/1-2001 i bygning 347 på DTU.
Efter et par timer går vi ud og spiser et sted i Lyngby.

Referat af generalforsamlingen 30. maj 2001

Generalforsamlingen blev afholdt som sidste punkt på årsmødets program med følgende dagsorden:

1. Valg af dirigent og referent.
2. Formandens beretning.
3. Valg af nye bestyrelsesmedlemmer.
4. Har vi brug for KIF?
   - Hvordan får vi bedre kontakt til "de yngre generationer"?
   - Har vi brug for at afholde et årsmøde hvert år?
   - Hvordan bør KIF udformes i fremtiden?
5. Forslag fra medlemmerne. Ingen forslag er indkommet.
6. KIFs økonomi. Herunder evt. en EU-ansøgning.
7. Eventuelt

ad 1 Karin Beyer blev valgt til dirigent og Bodil Helt til referent. Karin Beyer konstaterede at generalforsamlingen var lovligt indkaldt og beslutningsdygtig.

ad 2 Formanden, Eva Danielsen, præsenterede den afgående bestyrelse og gennemgik dens aktiviteter i det forløbne år.
Der har været et enkelt (meget vellykket) "gå-i-byen" arrangement, hvor Marie-Louise Siggaard Andersen fortalte om iskerneboringer fra Grønland og viste rundt i glaciologernes frysekælder.
Der er udsendt tre nyhedsbreve.
Der er oprettet en KIF-database som kan findes ved at man går ind på KIFs hjemmeside, men der er foreløbig kun fire navne i databasen.
Der er oprettet en e-gruppe, men også her er tilslutningen beskeden.

ad 3 Formanden konstaterede at rejseaktiviteten blandt de hidtidige bestyrelsesmedlemmer stadig er betydelig, så der som sædvanlig var et stærkt behov for at få nye medlemmer til at gå ind i bestyrelsesarbejdet. Følgende tre blev valgt:
Margit Christiansen (Randers Statsskole), Margit.Christiansen2@skolekom.dk
Vibeke Jürgensen (Panum Instituttet, Københavns Universitet), vwj@fys.ku.dk
Birgitta Nordström (NBIfAFG, Københavns Universitet), birgitta@astro.ku.dk
Hermed består bestyrelsen af disse tre plus Eva Danielsen, Kirstine Berg-Sørensen, Dorthe Posselt, Anja C. Andersen, Tina Christensen, Liv Hornekær og Winnie Svendsen. Ling Miao er suppleant.

ad 4 Baggrunden for dagsordenens punkt 4 var givet i nyhedsbrev 27 og blev kort ridset op af formanden: der er manglende respons fra medlemmerne til både årsmøde, database og e-post gruppe.
Databasen. Der var udsendt spørgeskemaer for at lodde interessen inden oprettelsen af databasen, og flere medlemmer udtrykte undren over at de ikke var kommet med i databasen selv om de havde returneret det udfyldte skema. Formanden undskyldte uklarheden omkring spørgeskemaerne. Generalforsamlingen tilsluttede sig at bestyrelsen gør et nyt forsøg på at få databasen til at fungere: Et eksempel på tekst til databasen skal bringes i nyhedsbrevet, og medlemmerne skal opfordres til at sende den tekst de vil have med i databasen til Tina eller Eva - helst som e-post.
Årsmødet. Stemningen var overvejende for at holde møde hvert år. Man diskuterede om man skulle fortsætte med at holde mødet onsdag før DFS mødet eller flytte det til lørdag efter DFS mødet. Den efterhånden ret gamle spørgeskemaundersøgelse viste flertal for lørdag, og generalforsamlingen pålagde bestyrelsen at forsøge at lægge mødet om lørdagen, om muligt allerede i 2002. Desuden diskuterede man om man kunne finde endnu mere attraktive foredrag og udvekslede erfaringer med hvordan man kan få især flere af de helt unge til at komme – og til overhovedet at melde sig ind. Liv og Marie beskrev AU-modellen, hvor medarbejdere og studerende tilmelder sig DFS mødet OG KIF mødet ved at skrive sig på en ophængt liste. Det fungerer godt.

ad 5 Ingen forslag.

ad 6 Der var almindelig tilslutning til at bestyrelsen går videre med at undersøge om KIF kan lave en ansøgning til EU om støtte, eventuelt som et dansk-svensk samarbejde. Der findes penge i EU til KIF-lignende formål, men EU foretrækker "store" ansøgninger som kan betyde et betragteligt arbejde for bestyrelsen. Det er muligt at få penge til foredragsholdere, rejser til møder, og hvis nogen vil kønsforske kan der også søges om lønpenge.
Kassereren gjorde opmærksom på at KIF har en bevilling fra DFS, som ganske vist ikke er stor, men som dog giver mulighed for en del aktiviteter.

ad 7 Intet.

International konference om kvinder i fysik

IUPAP (The International Union of Pure and Applied Physics) arrangerer en international konference omkring emnet "Women in Physics" (http://www.if.ufrgs.br/~barbosa/conference.html). Konferencen vil finde sted i perioden 7-9 marts 2002 og bliver holdt i UNESCOs hovedkvarter i Paris. Konferencens formål er at forsøge at forstå hvorfor der findes så få kvinder inden for fysik. Ved at belyse det håber IUPAP på at kunne komme med forslag til tiltag der kan øge mængden af kvinder i fysik.

Grunden til at IUPAP vil arbejde for at få flere kvinder ind i fysik er simpelthen at de mener der er for få på nuværende tidspunkt. Kvinder udgør halvdelen af befolkningen, men mindre end hver femte forsker er kvinde. Selvom der er store forskelle landene imellem er der en iøjnefaldende lighed i alle lande: andelen af kvinder falder markant for hvert trin

på karrieren. Kvinder er en vigtig ressource til styrkelse af forskningens kvalitet. Fysik snyder derfor sig selv, hvis kvindernes potentiale ikke udnyttes i forskningen.

I forbindelse med konferencen er IUPAP gået igang med at indsamle statistik om hvor mange kvindelige fysikere der findes i de forskellige lande. Desuden vil de forsøge at kortlægge de barrierer der evt. findes for kvindelige fysikeres mulighed for at gøre karriere i de forskellige lande. Denne kortlægning af kvindelige fysikeres forskellige karriereforløb foretages via en stor spørgeskemaundersøgelse og alle kvindelige fysikere (uanset hvad du idag arbejder med) opfordres til at deltage, så tøv ikke med at udfylde skemaet. Det findes på http://www.if.ufrgs.br/~barbosa/questions.html.

Det er arrangørernes tanke at hvert land skal stille med en delegation bestående af mindst 5 personer hvoraf **halvdelen gerne skulle være mænd**. Jeg forsøger at koordinere den danske deltagelse i konferencen, herunder at skrive ansøgninger om penge til deltagelse. Skulle du være interesseret i at deltage så kontakt derfor venligst (så hurtigt som overhovedet muligt): Anja C. Andersen, Astronomisk Observatorium, Juliane Maries Vej 30, 2100 København Ø, anja@astro.ku.dk, tlf: 35 32 59 69.

Dansk indlæg til IUPAP konference:

Women in Physics in Denmark

Anja C.Andersen, Niels Bohr Institute for Astronomy, Physics and Geophysics, Copenhagen University, Juliane Maries Vej 30, DK-2100 Copenhagen, *anja@astro.ku.dk*

Denmark has a high career rate of women measured on an international scale. The existence of inexpensive and well-functioning daycare centers has contributed to make this possible. Therefore it is all the more puzzling that women are still not represented in significant numbers in some fields such as research, politics and management.

In Denmark the first female full professor in physics was appointed in 2001 and among the permanently employed research physicists less than 2% are women. In the pipeline of physics students about 20% are women. This number has been constant for almost 15 years, before that the number was about half.

The situation with the lack of women in research positions is a general problem at Danish universities. In humanities, there are a higher number of female full professors and permanently employed researchers, but the recruitment pool is also significantly larger (often above 70%) so the problem of the lack of women is on the same scale as seen in physics. The low representation of women in physics research in Denmark are therefore part of a general trend of a low percentage of women in research. This causes a lack of role models, supervisors and mentors for students and young female researchers. In order to increase female recruiting to research position, it is necessary that more women show that it is possible to be a female researcher. It is therefore of crucial importance that the female element at all levels of the research hierarchy is increased, so that role models really are roles as well as models.

The fact that the number of women at the upper levels of the scientific hierarchy does not reflect the number of women educated in a scientific field, implies that a lot of potentially promising talent is lost at the universities. The female physicist who leaves the university career pipeline gets a job easily as a physicist (There is no unemployment among physicist in Denmark), but outside the university, typically as high-school or college teacher or in private industry. The lack of women researchers in physics is therefore more of a problem for the universities than for the individual woman.

It is about time that the universities acknowledge that in order to recruit the most talented people in the workforce it is necessary to include women. Inertia, however, seems to be as evident at universities and relevant ministries as in Newton's laws of motion, so even today many universities frequently act as if they can afford to give up the talents of half of the citizens.

Affirmative action has not been practiced in Denmark to any significant degree and it is not likely that it ever will since there is a strong opposition, both among men and women, against it. It is considered undemocratic. Therefore the initiatives that have been made so far to alter the current status of a low number of women in university research carriers have depended on a few persons at the top level that was dedicated to the problem. For instance, in 1997 the (female) research minister made the lack of women in research

an issue (A report on "Women and Excellence in Research" can be found at the homepage of the Danish Ministry of Research http://www.fsk.dk/fsk/publ/women/index.html) and for about 8 months it was debated in the media and at the universities, but due to a rearrangement of the government the research minister was exchanged after only one year and the next minister had other things on his agenda. So the results were only sporadic initiatives that faded out fast. At the Natural Sciences Faculty of Copenhagen University a limited number of two-year "Curie scholarships" used to be granted to make it possible for female researchers who for some reason had lost contact with Danish research to renew their qualifications. Unfortunately these scholarships no longer exist due to budget cuts.

Following the example of Norway, the Danish Physical Society has, in an attempt to promote women physicists, established a network for women in physics in Denmark (http://www.nbi.dk/kif). The main objectives are: . To create a network for exchange of information and knowledge among women physicists. . To increase the visibility of women working in various fields of physics in Denmark. . To increase the number of women studying physics and working in the field of physics research by identifying gender barriers in the career paths of women in physics and by working towards removing such barriers. . To exchange information on teaching methods which can enhance girls' and young women's interest in and benefits from physics and to give women more self-confidence in their field.

These objectives we meet through the publication of a newsletter (in Danish), an e-mail list and through meetings, joint colloquia, and seminars. Seminars and joint colloquia are open to the public.

In Denmark a great challenge for research policy in the coming years is that a large number of researchers will retire at the same time (2007). At this occasion, the universities are facing an unprecedented chance to change the fraction of women in physics research. If they do not take this chance - the prospects of changing the gender situation of physics in Denmark are bad.

Referat fra FOm/f symposium, Amsterdam, 21/9 2001

D. 21/9 havde den hollandske pendant til SNF, FOM, inviteret til symposium for kvindelige fysikere. Dette var det første møde af sin art, men tanken er at mødet skal afholdes hvert andet år, formentlig med et tilsvarende indhold.

Mødet blev afholdt i Amsterdams centrum, i det fornemme gamle Hotel Krasnapolsky, så stemningen var "særlig" lige fra start. Programmet bestod, foruden en velkomst af FOMs formand, af fire faglige foredrag (ved kvindelige fysikere, herunder referenten) og af to parallelle "workshops". Desuden frokost og middag, alt betalt af FOM. Ialt 110 kvindelige fysikere, fra såvel industrien som universitetsverdenen havde tilmeldt sig. Jeg havde ikke indtryk af at f.eks. gymnasielærere var blevet inviteret.

Tilsyneladende har det hollandske naturvidenskabelige forskningsråd bestemt sig for at lancere et program med forskningsmidler for kvindelige forskere. Symposiet var arrangeret som et led i dette program, og et af formålene skulle bl.a. være at opfordre de kvindelige fysikere til at samle sig i netværk. Der eksisterer i forvejen et netværk for kvinder i (dele af) naturvidenskab (informationsvidenskab, matematik og fysik), med

hjemmesiden http://www.science.uva.nl/misc/nimf/ , så hvorvidt der vil blive dannet et netværk af kun kvindelige fysikere er uvist.

Men tilbage til dagens program. Første foredrag var af Riet Peters, professor i teknisk fysik ved Twente universitet, der talte om "Fetal magnetocardiography". Magneto-Cardio-Grafi (MCG) er analogt til Elektro-Cardio-Grafi (ECG), men måler som navnet antyder de magnetfelter, der opstår pga. strømme i hjertet og de omgivende dele af legemet. Riet Peters' arbejde vedrører sådanne målinger på ufødte fostre, ideen er at metoden skal kunne bruges diagnostisk til vurdering af fostrets hjertefunktion.

Efter en kaffepause holdt KIFs udsendte sit foredrag, efterfulgt af Marjolein Dijkstra, en ung forsker ved Utrecht Universitet. (Hun var stand-in for Lydia Sohn, adjunkt ved Princeton Universitet, der måtte melde afbud oven på terrorbegivenhederne.) Trods det korte varsel holdt Marjolein Dikstra et spændende foredrag om "Simple Models for Complex Fluids", omhandlende hendes beregninger på entropi-drevne faseovergange i sådanne "komplekse væsker".

Herefter var alle klar til frokost, desværre var frokostpausen ikke lang nok til at vi kunne studere de mange flotte posters førend de to workshops startede. KIFs udsendte havde meldt sig til workshop'en "Career-planning and personal development", ved Marike Verbeij-de Geus, karriere-konsulent. Den anden workshop gav information om fondsmidler i Holland.

Karriere-konsulenten havde sat sig lidt ind i hvordan det er at være fysiker, men foredraget/diskussionen var alligevel lagt meget generelt op, og nogle af de punkter, deltagerne fremlagde undervejs var hun ikke rigtig gearet til at forstå eller give nogle forkromede løsninger på. Bl.a. blev det diskuteret hvorledes kvinder kunne gøre noget for at ændre de mandsdominerede normer på fysiker-arbejdspladser, og om det er muligt at være "sexet" og samtidig have magt og indflydelse (!) Det affødte også en del diskussion da en meget talende spansk fysiker sagde at grunden til den lave procentdel af kvinder i fysik i Nordeuropa måtte skyldes kulturen for i Spanien (og Italien) var der masser af kvindelige fysikere. Alt i alt en interessant oplevelse, men som sædvanlig i den slags fora var der for lidt tid til diskussionerne.

Dagen afsluttedes med et foredrag af Professor Ana Achucarro, Groningen Universitet og Baskerlandets Universitet i Bilbao om "The virtues of defects". Ana Achucarro arbejder med topologiske defekter i kosmologi, men hun fortalte i hvor stort et spænd af felter, det er relevant at beskæftige sig med topologiske defekter.

Herefter afsluttedes med middag, men jeg skulle nå et fly hjem til København og forlod mødet inden. Det var lærerigt at se hvordan det hollandske forskningsråd, herunder en arbejdsgruppe af kvindelige fysikere, kalder kvindelige fysikere sammen. Meget af diskussionen i kaffepauser og ved frokost drejede sig om "hvorfor er det her nødvendigt", en kommentar jeg personligt mener skal ses i lyset af at mange af de deltagende var forholdsvis unge, dvs. speciale- eller Ph.D. studerende, der endnu ikke i særlig høj grad havde følt "en forskel" fra deres mandlige kolleger. Kun en enkelt af de, jeg sad ved rundbord med, var nået til at vælge børn og parforhold fra, de øvrige var ikke nået til at spekulere over børn endnu. Derfor var der f.eks. heller ikke anledning til at diskutere f.eks. de ringe muligheder, jeg har hørt, der er for børnepasning i Holland.

Kirstine Berg-Sørensen

KIF ekspertdatabase - send os et indlæg!

Som tidligere nævnt har vi i tråd med KIFs formålsparagraffer om at synliggøre kvindelige fysikere oprettet en ekspertdatabase over KIF-medlemmer på vores hjemmeside (http://www.nbi.dk/kif/database.html).

Databasen er tænkt som en mulighed for at få kontakt med kvindelige fysikere, f. eks. fordi man gerne vil have holdt et foredrag eller man har faglige spørgsmål. Den henvender sig altså både til andre KIF-medlemmer, andre fysikere, journalister og undervisere m.v.

Vi har udarbejdet et todelt format. Der er en forside med en kort præsentation af alle medlemmer af databasen. Oplysningerne her er kortfattede og stikordsprægede. Hvert medlem har desuden en mere uddybende side som der henvises til fra forsiden.

Dette er en opfordring til alle medlemmer om at skrive et bidrag til databasen. På de følgende sider ses et par eksempler på hvordan nogle af os har valgt at udforme vores indlæg og disse kan måske virke som forlæg og inspiration for andre.

Selv om de fleste indlæg i øjeblikket er fra medlemmer der beskæftiger sig med forskning, vil vi meget gerne opfordre alle KIF medlemmer til at bidrage.

Sådan gør du:

En mulighed er at udfylde skabelonfilen på hjemmesiden med dine egne data. Den kan redigeres i en vilkårlig teksteditor. Hvis du bruger Word eller WordPerfect vil det lette vores arbejde hvis du gemmer dokumentet i html-format. Herefter sender du dit bidrag til Tina Christensen på tic@dmi.dk.

En anden mulighed er at skrive det du ønsker skal stå i dit indlæg som et almindeligt brev/email, så indsætter vi de nødvendige html-koder.

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Hvis du er i tvivl om noget er du yderst velkommen til at kontakte:

Tina Christensen
Sol-Jord-fysiksektionen
Danmarks Meteorologiske Institut
Lyngbyvej 100
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FORSIDE

Irene Hazell
Hospitalsfysiker i Radiofysisk Laboratorium, Odense Universitetshospital

Radiofysisk Laboratorium Odense Universitetshospital 5000 Odense C Tlf: 65 41 29 84 (sekretær) Fax: 65 41 16 53 irene.hazell@ouh.fyns-amt.dk	**Faginteresser: Medicinsk fysisk** I afdelingen benyttes ioniserende stråling (fotoner og elektroner) til behandling af cancer og til lindring af følgerne af cancer. Al forskning og udvikling i afdelingen er relateret til forbedring og kontrol af behandlingerne. Mine hovedinteresser er: • In vivo dosimetri: måling af dosis på patienten under behandlingen. • Brachyterapi: behandling med en radioaktiv kilde placeret i patienten.

Forslag til foredrag:

- Hvad laver en hospitalsfysiker?
- Om strålebehandling af cancer, fysik, teknik og patienter

UDDYBENDE SIDE

KIF-databasen om Irene Hazell

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Fax: 65 41 16 53
email: irene.hazell@ouh.fyns-amt.dk

Faginteresser

Medicinsk fysisk, specielt anvendelsen af ioniserende stråling til behandling af cancer.

Ud over klinisk arbejde, bruges tiden på implementering af nyt udstyr samt forskning og udvikling. Vi arbejder på at få en bedre kontrol med hvilken dosis der gives, bedre og mere præcise værktøjer til beregning af doser og i samarbejde med lægerne undersøges sammenhænge mellem dosis og patienternes videre forløb (hvor længe lever de og med hvilke bivirkninger).

Mine hovedinteresser er:

- In vivo dosimetri: måling af dosis på patienten under behandlingen
- Brachyterapi: behandling med en radioaktiv kilde placeret inde i patienten

Foredrag af populær karakter

- Hvad laver en hospitalsfysiker?
- Om strålebehandling af cancer, fysik, teknik og patienter, evt. specielt om kræft i underlivet

Uddannelse og ansættelse

Hospitalsfysiker i Radiofysisk Laboratorium, Odense Universitetshospital, 1998-
Hospitalsfysiker i Afdeling for Medicinsk Fysik, Århus Kommunehospital, 1996-1998
Erhvers-PostDoc ved Kamstrup Energi (i samarbejde med Afdelingen for Optik og Fluiddynamik på Risø) 1995-1996
Ph.D. i Atomfysik, Institut for Fysik og Astronomi, Aarhus Universitet, 1995

Undervisningserfaring:

Øvelsesvejleder på diverse kurser på Institut for Fysik og Astronomi, Aarhus Universitet i perioden 1991-1994
Undervisning i strålebehandlingens fysisk for sygeplejersker, radiografer og læger

Medlemskab af organisationer

Dansk Selskab for Medicinsk Fysik (DSMF) siden 1997
Dansk Selskab for Onkologi (DSO) siden 1998
Netværk for Kvinder i Fysik (KIF) siden 1992
Dansk Fysisk Selskab siden 1989

FORSIDE

Eva Danielsen
Lektor ved Institut for Matematik og Fysik, Den Kgl. Veterinær- og Landbohøjskole

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Den Kgl. Veterinær- og Landbohøjskole
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eda@kvl.dk

Faginteresser: Biofysik

- Samspillet mellem proteiner og metalioner og betydningen for proteinets funktion
- Elektrontransport-proteiner i fotosyntesen
- Eksperimentelt og teoretisk arbejde med en kernefysisk analysemetode til studiet af kobber- og zink-proteiner

Forslag til foredrag:

- Hvad har tomme øldåser og fulde sodavand med vejret i Danmark at gøre?
- Hvordan kobber-proteiner erstatter kobberledninger i levende celler

UDDYBENDE SIDE

KIF-databasen om Eva Danielsen

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tlf (privat): 45 88 99 61
email: eda@kvl.dk
Hjemmeside: http://www.matfys.kvl.dk/~eva/

Forskningsinteresser

Jeg arbejder med at forstå samspillet mellem proteiner og metalioner i proteiner hvor metalionen har stor betydning for funktionen af proteinet. Som et eksempel kan nævnes hvordan et elektrontransport-protein i planter transporterer elektroner mellem forskellige proteiner som hver især har betydning for fotosyntesen. Dette arbejde handler både om vekselvirkningen mellem proteinerne og mellem proteinerne og "væggene" (membranen). Jeg er specielt ekspert i at anvende en kernefysisk metode (PAC) til at studere kobber- og zink-proteiner. I den forbindelse arbejder jeg både eksperimentelt og med videreudvikling af teorien for PAC - specielt med henblik på data-analyse. Jeg er især interesseret i hvordan bevægelse i og af proteinerne påvirker PAC-målingerne.

Foredrag af populær karakter

Som en del af KVL's udadrettede aktivitet er det muligt at bestille (nogle få) foredrag om året. Forslag til titler kunne være:

- **Hvad har tomme øldåser og fulde sodavand med vejret i Danmark at gøre?** (Foredraget er inspireret af undervisning i Lokal- og Mikroklima og er udviklet i forbindelse med Dansk Naturvidenskabsfestival 2000. Det består af en række små forsøg, som forsøger at forklare, hvorfor det regner mere nogle steder end andre i Danmark. Det kan rettes mod alle aldre, men kun forholdsvis små grupper (ca en klasse). Jeg har foreløbig holdt det for 1. og 2. klasser)
- **Hvordan kobber-proteiner erstatter kobberledninger i levende celler.** (Foredraget er inspireret af den forskning, vi i øjeblikket arbejder med. Det er mest egnet til matematiske gymnasie-elever.)

Uddannelse og ansættelse

Ansat som lektor (tidligere adjunkt) ved Institut for Matematik og Fysik.
Ph.d. i biofysik fra KVL, 1991 Kandidat i Fysik med bifag i Matematik fra Århus Universitet, 1987

Undervisningserfaring

På Institut for Matematik og Fysik har jeg undervist i de fleste af instituttets fysik-fag. Generelt er det fag, hvor fysik og biologi mødes. I øjeblikket underviser jeg i Lokal- og Mikroklima, som handler om samspillet mellem landskab, planter og klima. Jeg underviser også i Fysiske Metoder i Biologien, hvor jeg underviser i NMR, Mössbauer-spektroskopi og PAC anvendt på at forstå proteiners struktur og funtion. I Molekylær Biofysik har jeg undervist i bl.a. kræfterne i et protein og lysabsorbtion, og i Biofysik har jeg undervist både i bio-mekanik, væskestrømning i planter og dyr, molekylær biofysik (f.eks diffusion, nerveledning og osmose) m.m.

Publikationer

Se min publikationsliste på http://www.matfys.kvl.dk/~eva/publications.htm

Administrativ erfaring

Erfaring i at skrive ansøgninger om forskningsmidler både nationalt og i EU-sammenhæng (sommetider med succes).
Ansvarlig for afholdelsen af en sommerskole i sommeren 2001.
Ph.d.-vejledning.
Medlem af LEG-kollegiet på KVL og formand for valgudvalget på KVL.
Bestyrelsemedlem i KIF

Franklin, Prof. Ursula - physicist

Looking Forward, Looking Back
(Text of an address by Dr. Ursula M. Franklin, C.C. FRSC, to the Conference, "More Than Just Numbers", on women & engineering, at University of New Brunswick, May 10, 1995.)

"..Having been asked to look forward as well as to look back, I would like to use the short time we have together to reflect on how we got to where we are now, so that we might see more clearly the path ahead and find out what needs to be done next.

..As a point of departure for this evening's reflections I would like to take you back to the murder on December 6, 1989 of the 14 young women who were students at L'Ecole Polytechnique in Montreal. This event has become a benchmark for all of us - because so much changed in the wake of this tragedy; it changed perceptions and interpretations of the climate and the realities of life for women in engineering.

In light of the sudden, horrible realization of what had happened in Montreal, it became possible - likely for the first time in Canada - to say, "this could have happened at OUR university, it could have happened in MY class." There was a quantum leap in reality recognition across this country.

I remember how my son who, like most sons, did not appear to have much interest in what mother was doing, phoned Peter Gzwosky's Morning Side to share his feelings on hearing the news of the murders and Marc Lepine's hit list. He suddenly understood that, at another engineering school, it could have been HIS mother's name on the hit list.

The shock of the events was, of course, particularly strongly felt within the engineering profession - and out of this atmosphere of profound upset it became possible to act, to inquire, to map the reality of the lives of women in engineering.

The resulting soul searching did not only bring inquiries and the commission on whose recommendation we meet today; **it brought also for many of us the first opportunity to name and specify what has been going on.**

It became possible to speak publicly about the chilly climate, about bias, sexism, misogyny and patriarchy. These concepts could be used and understood in the emerging discourse, a discourse that looked for ways and means to rectify the unacceptable conditions in the study and work environments of women engineers.

The process of identifying the obstacles in the path of women in engineering yielded a number of significant results; it responded to the publicly expressed need of the engineering professions to see more clearly what was going on in their own house; it allowed to separate specific obstacles and suggest remedial measures.

The report, "More Than Just Numbers" provided not only recommendations based on statistics and well documented evidence, but it also insisted benchmarks, tangible evidence of change and on accountability.

Thus the report expresses clearly that **fixing a few things behind closed doors is not good enough; what women are pressing for was, and is, equal participation in engineering opportunities AND transparent processes of selection and decision-making in appointments and promotion.**

These insights link the struggle of women in engineering to the fundamental issues in the general struggle of women for equal opportunities everywhere; there is always the same concern for justice and the same concern about the lack of respect afforded to women and their often implicit downgrading of their abilities.

Some of you will recall the surprised tone of voice when someone, on having learned of your field of study, would say, "Oh, you are in engineering -" as if implying that this may be really too difficult for a nice girl like you.

I remember well a funny incident that happened to me not too long ago. It was the first week of term and I was going into my office, when I saw a young student, his arm full of books, trying to negotiate the heavy double doors of the Wallberg Building in the Faculty of Engineering at my University.

Obviously a first year student making his way into the halls of the Faculty. I held the first door open for him, then the second door; he thanked me politely and then asked: "Do you work here?" "Yes" I replied. "Are you a secretary?" "No. I'm a Professor of Metallurgy." "Holy Cow" was his instantaneous response - quick and uncensored. It was a quite natural and uninhibited reaction, expressing disbelief and surprise at the possibility of a woman being a professor of metallurgy.

Surely, I am also not the only one here who remembers being the sole woman in a class, remembering professors asking whether one was not in the wrong lecture or lab. All such incidents illustrate our double grievance related to both the lack of justice and the lack of respect for our potential that runs through all our lives as women.

Speaking specifically about engineering education, there have been two basic directions in which the rectification of such grievances has been approached: **One approach was systemic, the other more case-specific and directly addressing women.** I used to call the latter

"**weight-lifting for girls**" and I have never been very enthusiastic about it.

Though I understand full well the need to encourage young women to enter engineering and to support them personally in every possible way, acculturating women into engineering and hardening them against the chilly climate may change the problematic aspects of the culture of engineering less than one might think. **The approach also put the prime burden of change on the disadvantaged -** which is never a very good idea.

Truly, it is not just a question of numbers, **it is a question of structural, institutional and cultural changes - systemic changes** that have to involve the elders of the engineering tribes as well as the majority of the traditional "average" male engineers.

And at this five year benchmark, we should recognize and celebrate the real and significant changes that have taken place. The mind-set that considered sexist student newspapers, crude initiation pranks and "girly" pin-ups integral parts of the education of engineers is no longer publicly acceptable; new codes of conduct have been issued, sexist language has been curtailed and criticized and issues of gender sensitivity have been advanced -- although we know, and heard again this afternoon, how much more work needs to be done, especially in the area of gender sensitivity.

Central to the achievements of the past five years is the fact that the grievances of women in engineering have become real and tangible - concrete issues about which something can and will be done, not figments of our imagination. Certainly, some issues will reappear in different guises: the girly calendars may be passé but **pornography on the internet and in the computer rooms is just coming at us and with it the "boys will be boys" and the anti-censorship arguments.**

I am confident, though, that **each new re-incarnation of sexism will find less acceptance and a clearer and faster rebuttal, because the climate has changed.**

You may well ask why I am still unenthusiastic about acculturating women into engineering, since I do see changes in the climate, brought about by concerted attempts to address the grievances of women in engineering.

Basically I **would like to make engineering fit for women, rather than women fit for engineering.** You see, I feel that the past exclusion of women from engineering has been bad for our profession; the exclusion of women has meant that some of the values that women have traditionally brought to their tasks have been missing in the habits of work and thoughts in engineering.

I know that, when some of my women students objected to the bad manners of their peers, to the put-downs of women and "artsies", etc., they were told: this is what engineering is like, you better get accustomed to it. If you can't hack it, go into early childhood education..

My point, however, is this: **There is nothing wrong with women and their values, including those that may make their professional advancement difficult. There is nothing wrong with caring, there is nothing wrong with NOT being aggressive and pushy. There is nothing wrong with expressing the hurt of being treated unjustly.**

What IS wrong is the put-down, the insensitivity and the lack of justice and respect - not women's response to it. And I, for one, do not want to see women engineers so "work hardened" ... that they lose their acute sensitivity, when they or others meet discrimination or injustice. Nothing is served if we were to become mere substitutes of our traditional male peers.

That's why I interceded this afternoon when someone made the suggestion that in discussion of the mentoring program, one might not want to speak about nurturing, but about coaching. I did not like this suggestion, because I don't think life is a football game and that coaching THE team to win THE game helps anyone in the end.

Language is very important, **language expresses our values and we should not be afraid to use words such as nurturing, concepts such as caring,** including the willingness to, if necessary, take second place on occasion. **Nurturing, caring and helping are the very attributes that our society so desperately needs - there is no point for us to downplay them - even at the risk of our own advancement.**

How, then, do we proceed from here, you will ask, as we come together to celebrate achievements, to express our gratitude to those who have helped to bring them about?

For my answer, let me take you back to the central theme of my thoughts on "looking forward, looking back", the fact that when we deal with questions important to women in engineering, we are concerned with issues of justice and compassion. Our work is therefore embedded in the patterns of change within the larger society of which engineers are but one component. How we, as women in engineering, conduct the next steps on the road towards our professional equality can be of considerable help - or of hindrance - to the advancement of our sisters in other fields.

Increasingly women are coming into positions of power and influence. I am profoundly convinced that **the conduct of women in power must be guided and informed by the collective experience of women when they were powerless. In other words, none of us can forget women's experience of exclusion and discrimination and tolerate or use practices of**

bias - bias not only on the basis of gender, but also on the basis of religion, ethnic origin or sexual orientation.

We cannot condone generic put-downs of "others" - just as we do not condone these tactics when they are applied to women as a group. The use of such a reciprocal yardstick may be one of the most important contributions that women, newly coming into positions of power and responsibility, can make.

There is another concept, another relic of the patriarchal structures of hierarchy and power, that needs re-visiting and re-interpretation and that is the concept of "rank". It is quite clear to me that **women view rank differently from men**. For us, rank is not a station in life or a figure of merit.

Rank is the social equivalent of a postal code; it tells others where we work and where our territory can be found. We rejoice when one of our sisters gets a promotion, a new postal code, a larger area of responsibility because of the greater contributions she may be able to make.

But recognizing peoples' rank is not like grading eggs and a promotion does not imply that someone who has been a Grade A small type has become, by some administrative miracle, a Grade A large one on July 1. **Peoples' human attributes do not change on a change of rank; they do not become better persons or better friends on promotion, nor do they become less valuable human beings if they were not promoted, if they have no rank to parade.**

I think that it is really important for women, as they move into positions of responsibility and power, not to be frightened by rank and not to be hypnotized by it either. Each of us can help in the ongoing process of clarifying the notion of rank by extending our unchanging care and friendship to those of our sisters who are promoted, as well as to those who are not.

There is another facet to our discussion for rank and promotion that needs to be mentioned here, lest someone might think rightful and unbiased promotion and advancement for women are now a rule.

Earlier I mentioned that some of the problems, well known to women in engineering, can resurface in new guises. Thus one finds that the gatekeepers of the old order may move from objecting to potential colleagues on the basis of gender, to questioning the legitimacy of their research interests.

In other words, no one in his right mind will say anymore, "I don't like women in the department." Yet it is not uncommon for senior staff to insist that any new person hired has to continue the area of research that old Professor what's-his-name had cultivated so faithfully over the past thirty years - effectively blocking the entry of someone who might want to do different research in a different manner. Gatekeeping regarding research fields happens and bears watching.

We need to be mindful of the danger that the present climate of cutbacks and retrenchments poses to the ongoing advancement of women in engineering. In this context, it is again important to stress that **women engineers are not mere substitutes or clones of their male peers, but bring - as women - different perspectives and experiences to their work.** All considered, it is certainly not yet plain sailing for women engineers.

My concluding remarks are addressed primarily to the younger women in the audience:

First of all, if you have been helped by your mentors, don't forget them now. They will be getting old and may need you as you have needed them.

Secondly, **don't forget your feminism and your solidarity with old women.** Feminism is not an employment agency for women; **feminism is a movement to change relations between people to more egalitarian, caring, and non-hierarchical patterns.** Feminism provides a way of life that our society, I feel, desperately requires that we need to practise.

And do remember that, even if the Marc Lepines of this world no longer haunt the engineering faculties of this country, **violence in most societies is rising - and usually this means violence against women and children. Don't be indifferent to their fate.**

Those of us who have the privilege of working in an environment in which violence - verbal as well as physical - has become unacceptable, have to assure that such environments are not going to remain exceptions but become the norm.

Finally, be careful and conscientious about the language you use and the images your words evoke. Language is terribly important; it is the vehicle of thought and concept, the medium of learning and re-enforcement of images. Don't make violence appear normal by using the language of organized violence; why speak about "target audiences."

Surely, you don't want to shoot your students or clients; you just want to reach those particularly interested. There really are no targets, no conquests, strategic plans or deadlines - only interest groups, changes of attitude and habit, plans and due dates. There is no aiming at, only addressing and responding.

There also remains the need to watch sexism in the language of social and political discourse. **Sexism has not yet disappeared - just think of the different connotations of the terms "bagmen" and "bagladies."**

The society that we envisage and work for will care for the homeless - called bagladies - and have no place for the manipulators of power - called bagmen.

With these thoughts that I have put before you for your reflection and use go my good wishes and my thanks for your attention."

Changing Roles for Women in Research Universities

Heidi Newberg
Rensselaer Polytechnic Institute

Invited talk, American Physical Society Meeting, April 2001, Washington, DC, session on Recruiting and Retaining Women

Each of us has had times in our lives when someone has said something to us which causes an internal reaction – whether for the good or for the bad – which causes that moment to become locked in our minds. I would like to relate to you some of mine.

I am a senior in college, I am visiting a graduate school, trying to decide whether I would like to go there, or if I want to go to graduate school at all. I am wandering the halls in the physics building, and see a door open. An older gentleman is sitting in his office. I ask if he has time to talk to me, and he waves me in. I don't know what we talked about, but at some point I asked him about something that was really bothering me. I told him I really liked hobbies like music and drawing and crocheting and dance, and I wanted to know if I could still keep up these hobbies and go to graduate school in physics. He told me that learning physics was really, really difficult, and it probably was not worth doing unless you dedicated yourself to it full time. In retirement there would be opportunities for pursuing hobbies. Years later, I discovered that this individual had a Nobel prize.

I knew by this time that an academic career in physics was difficult for women. Why? Because women can only have children when they are young. Academic careers in physics, as this gentleman was reinforcing for me, require an enormous commitment during exactly those years when most other women are getting married and having babies. I was getting the idea that I was supposed to choose between success as a physicist and ever having children and a family. I knew I would never be happy without children. So the question was, was it worth the work of going to graduate school, only to find that this career was incompatible with raising children?

I am a senior in college, I just received a letter from UC Berkeley telling me that I have been accepted into the graduate program in physics. I feel great, since this was where I really wanted to go, and it was quite difficult to get into. One of my (male) classmates finds out about my acceptance and says something like, "You know why you got in to Berkeley? Because you're a woman." He had not been accepted to the graduate schools he was hoping to attend, and he was bitter about it.

At the time that this person said these things to me, I thought to myself, "Maybe it's because my grades are better than yours, or because my advisors had better things to say about my research potential, or because my standardized test scores were higher than yours. But, the idea that maybe I was accepted to Berkeley because of affirmative action stuck with me. After all, the score I received on the GRES test was the lowest percentile I had ever achieved on any exam.

I am in about my third year of graduate school. The center which funds part of my research is being reviewed by an external advisory panel. I am asked to give one of the talks for the panel. I am very excited about my research project, which is aimed at measuring the deceleration parameter of the Universe using Type Ia supernovae. I prepare and deliver the talk, and attend the reception afterwards. I am introduced to one of the panel members, and I am ready to sell him on the center and the importance of pursuing my area of research. He looks at me for a few moments, and finally says, "You know, I've never graduated a woman." And then he proceeded to tell me about all of his graduate students who started graduate school, but didn't finish.

I had just given a talk on my research project, for goodness sakes. I was trying to act like a scientist, look like a scientist, schmooze like a scientist. And all this man could see was that I was a woman. Later, I complained about this to another member of the center. She told me not to be too hard on him, since he was really trying. I began to mentally note the approximate ages of anyone who had trouble seeing past the fact that I was a woman, and discovered that men older than my parents, as hard as they tried, couldn't really get past my gender. It's not that they didn't think women were capable of science, they just didn't know why a woman would want to do it, or how to talk to them if they did. This is of course a generalization – there are certainly older men who are more forward-thinking and younger men who have difficulty working with women.

Like all NSF-supported science centers, the center I was involved with had an outreach portion. One of the center's programs was called the In Balance program. It was devoted to studying, and ultimately changing, the culture of physics to make it friendlier to women. It wasn't long into this program before the male graduate students complained that the culture wasn't so friendly to them, either. So the program director widened the goals to include cultural change for all young physicists. The first part of the program consisted of brown bag lunches including a guest who was the focus of the discussion group. I remember attending three of these. The first one was a female professor from an ivy-league level university who had a young child and was working insane hours to try to get tenure. She was very upset about her treatment and maybe there was something about marital troubles. I think everyone was in tears by the end of this. The next speaker was a woman who had gone to graduate school in physics, and had left the academic career path to become a mother and a high school teacher, I think. Anyway, she was happy. We graduate students all thought she was an example of failure – one of those people who is held up as an example of how women do not make it in physics careers. The third person was a male postdoc who had a young baby and a wife who stayed home with the baby. He told us that he was working in the lab until three o'clock in the morning, that it was difficult to get sleep at home since the baby woke so often. He was often tired, but working hard on his career.

At that point, I decided that going to "In Balance" lunches was not compatible with keeping myself in balance, and stopped going. I did not need to hear about any more pain, or meet any more stereotypes in person. To the center's credit, these lunches stopped soon afterwards, and were replaced by retreats and focus on cultural change. For me, the most memorable moment from these was when one (male) postdoctoral researcher suggested that one way to change the culture would be to lock all of the laboratories on weekends and force everyone to go home.

I am a graduate student. A senior woman physicist comes to visit the university. She invites the women graduate students to meet with her. She serves us baloney and American cheese on saltines. She dresses like the men. She later confides in me in the hallway one day that she is fighting a disease, and *all* women physicists she knows eventually get some horrible disease. She is not sure why that is.

I am not sure whether to worry about this, so I worry anyway, just to be on the safe side.

I am a postdoc. I have just given an invited lecture at a university. Afterwards, in a discussion with one of the university's senior administrators, I ask whether he would recommend to his children that they pursue a career in science. He looks at me for a few seconds, then tells me, "Well, you have a gender problem." I did not intend for this to be a discussion about gender, but about the difficulties that young scientists face at this time. I mentally note his age – definitely older than my parents. Then I realize that he is not on a visiting committee. He is not in my field. He will never have any control over my career whatsoever. And I allow myself to get mad. Although I cannot remember the details, the conversation does not improve.

One of the senior faculty in the school, a friend of mine, came in the middle of the shouting. It lasted maybe five minutes, but seemed longer. He spent the whole time pacing back and forth and saying nothing. Afterwards, he didn't stop pacing. Eventually I shouted, "What would you have done if all of your life, people had told you that you had a gender problem and that you could not have both

a career and an family?" He paced back and forth some more and finally said, "Well, I wouldn't have done it." That man was a member of the National Academy of Sciences. The administrator, it turns out, did later have occasion to influence my career, and fully supported me.

I am a postdoc. I have adopted one daughter, and a year later given birth to another. I am attempting to breast-feed her though I have returned to work, and have purchased a breast pump to be used when I am at work and my daughter is at home with my husband or at daycare. I notice the laboratory property group has excess cubicle dividers and a small desk, and request two dividers and the desk. The property manager asks what I plan to do with them. Boldly, I tell the man that I want to put them in the ladies room that is right by my office so that I can work at the desk while I use the breast pump with a little bit of privacy. This answer causes embarrassment, a facilities inspection of the ladies room in question, and concern over cleaning issues and the safety of plugging in electrical motors and extension cords in bathrooms. A week later, I am informed that they have worked out a deal that I will be permitted to perform this – eh – "procedure" (he couldn't say breast pump) in the medical department by appointment. I think to myself that I will use the breast pump by appointment in the medical department if he will make appointments to pee down there. It is, after all, just another bodily function that merits a little privacy and the need to wash up afterwards. I discover that other women have used a slightly larger rest room with a somewhat larger anteroom on another floor for this purpose. Once or twice a day I sit in this bathroom and pump, and the ladies that come in and out stop and talk to me about when they used to breast pump, and how much milk I am producing compared to what they did, and how the baby is doing, etc. Each time I pump takes about a half an hour, or maybe a little more.

The books I have been reading about breastfeeding talk about how many companies have built special rooms for breast pumping, which are private and contain a desk and a sink for washing up in. I have actually traveled with the breast pump and have never seen such a thing in a university, though everyone has always found a large ladies' room or locked a windowless classroom for me to use.

I am now an Associate Scientist. My daughters are one and two years old. Over the past two years I have taken six months of maternity leave. Most of the leave was taken two days per week to make it last longer (my husband and I have each been working three days a week with one day weekends). It is a condition of my employer that all vacation time be used up as part of the guaranteed three months of (otherwise unpaid) leave afforded by the Family Leave Act. I have two children in diapers and in daycare full time. At least one of the children is sick every other week. Before I became a parent the five weeks per year of vacation time I received seemed infinite. Now my leave coupled with my husband's seemed barely adequate to cover the days when the kids were sick. But, my older daughter is almost three and mostly potty-trained. I am starting to build up a cushion of vacation time so that I won't worry about having it when the kids are sick and maybe we will even be able to take a vacation. At a kids' birthday party / barbeque, my younger daughter puts both hands directly on the grill and receives second degree burns on both palms. My nerves are shot. My daughter is out of daycare for a week with bandaged hands and requires almost constant care. My cushion of vacation is gone.

I return to work, but I am beginning to feel that I cannot keep going this way. I ask my supervisor if I can work 80% time. I plan to work four days per week – whichever four days neither of my kids were sick. My supervisor agreed, but the division head would not sign the papers without talking to me first. The division head thought I might be able to work this out, without losing pay, by working from home part of the time. I tried to explain to him that one- and two-year-olds don't play by themselves very long, and about the problems when they become sick. He told me that he and his wife didn't have any children, and they just worked all of the time. I wasn't sure how to respond to that.

To his credit, the division head signed the papers, and I worked for a year at 80% time. In reality, I'm sure I often worked forty hours per week with this schedule, but I didn't feel guilty about the time I spent with my children. It amounted to about two months of leave, and may easily have saved my sanity and my career.

Now, I want every male physicist who is postdoc level or younger to put your hands over your ears and hum softly until I finish this next section.

Imagine going back to your home institutions and doing the following thing: any time a male student approaches you during recruiting or as an advisee or when you are on a visiting committee, you tell him the following "truths:"

You know, you have a real disadvantage as a man in physics. In my day men did physics and their wives took care of the babies, but not anymore. Now, women have careers. Not only that, they expect their husbands to share housework and child-raising duties. How are you going to be able to do all of those things, and keep your career going?

What kind of woman are you going to meet, anyway? The few women you meet in your classes will be so sought-after that your chances of scoring with them is next to zero. If you fall in love with a career-oriented woman, she will not be happy about your need to relocate to odd places in the country every two or three years before you become established. If she does not wish to work outside the home, you will not be able to support her and the children they always want to have. I cannot tell you how many recent students I have known that have given up on their academic careers because they wanted to give their children a house instead of an apartment. Their wives were tired of scraping by, moving every two years, and supporting their husbands through job search after job search and rejection letter after rejection letter.

It is really much easier for the women. They are certain to meet as many men as they can handle. Many of them marry men who have well-paid jobs, and can survive in low-paying academic jobs and still afford a house and daycare for the kids.

A wife or girlfriend will tie you down, and make it difficult to move across the country every time a better opening presents itself.

You just tell them that – starting about their senior year in high school. Then we'll see just who develops a confidence problem.

Okay – if you're sitting next to a man who is humming to himself, please tap him on the shoulder because it's okay to start listening again.

What is the real truth here? I want to point out one very important point about my whole story. No matter how many people bombarded me with words and "truths," about what I could and could not do, nobody stopped me in any physical way that I am aware of. The chains with which these experiences might have bound me did not hold me down. I worked very hard not to let them define me.

I am reminded of the week I spend in third grade where we discussed the popular wisdom that by the time I reached adulthood, machines would have replace so much of the workforce that people would only have to work 20 to 30 hours per week. The biggest industries were going to be entertainment and tourism, since we would all have a high standard of living and loads of free time! In my undergraduate days, the word on the street was that by the time I finished graduate school, there were going to be loads of jobs for physicists, since so many of the professors would be retiring at that time. In fact, the job market was substantially worse.

I recently read through the National Academy of Sciences Symposium on Careers of Women in Science, "Who will do the science of the future?" There are several good articles in the transcripts. One of them is by Richard Tapia, from Rice University, on mentoring women in science. In addition

to his discussion of risk adversity in minorities and women, which I agree is a serious problem, he notes that: "Science culture sells an opportunity for them to either have no husband or a late marriage, no children or few and late, live away from the extended family, much stress, little relaxation." I am in fact a counter-example to this. I have a husband. I was married at 25. I have two children, and was the foster parent for three others. Two years ago, I moved back to Albany, New York, partially because I wanted to be closer to my parents and my brothers. My children's most distant grandparent is only a few hour train ride away. As for the stress and relaxation, it is difficult to know what the relevant scale is here. There are plenty of stressed people in every walk of life. I know some for whom the biggest source of stress is that they have wanted to become scientists all of their lives – and they're not.

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In my undergraduate class, only 20% of the students were female. In my graduate school class, only 10%. In my graduate school research group, the only women besides myself were the administrative assistant and some of the undergraduates who cycled through over the years. I don't recall a single female scientist who worked in the field of supernovae at the time. I went from there to work on the Sloan Digital Sky Survey – an international project to digitally map 10,000 square degrees of the sky and map the large scale structure of the Universe with a million galaxy redshifts. Of the 102 builders of the SDSS, 9 are female (9%). Interestingly, the women are (within the small number statistics) a representative cross section of the collaboration in terms of seniority and occupation (scientist, computer professional, engineer, or manager).

You can imagine my amazement when I arrived at Rensselaer to find that 23% of all of the people with faculty appointments in the physics department were female – 7 out of 30! If you take me out of the statistics, it's still 22% of the people I see around me. This may not seem like a haven for women to you, but to me this is more women than I have seen in one place since before I went to college! Unlike the SDSS, though, the distribution of women by title is not even. Women comprise a disproportionate fraction of the non-tenure track clinical faculty. They are also over-represented in the administration. I was shocked to realize one day that the Physics Department Chair is female, the Dean of the School of Science is female, and the President of the University is female. In my "line management," the Provost stands out as the token male. The new president of Rensselaer is Dr. Shirley Jackson. She is the former head of the Nuclear Regulatory Commission, a physicist, and a very strong, black woman.

Given this shift in my working environment, it is reasonable to ask whether it makes any difference to work under women. This question is easy to ask, but very difficult to answer. To get some numbers that are not completely dominated by small number statistics, I tried tabulating the fraction of women in the entering class of the university before and after Shirley Jackson came to the university. In 1996, 226 of 899 Freshmen were women (25.1%). In 1997, 25.1%. In 1998, 22.8% of the Freshmen were women. In the fall of 1999, Dr. Shirley Jackson was inaugurated as the president of Rensselaer, with an entering class of 1323 students, 22.3% of which were women. Okay. Word of her coming was not enough to bring the women in. Last year, in the year 2000, Rensselaer recruited a record 334 of 1304 female students 25.6%. The only thing I can definitively conclude from this is that bringing in a strong woman at the top is not going to change the world overnight. But in the long run I think it might.

At the top levels of Rensselaer, there are no administrators who find it uncomfortable to work for a woman. No one has ever suggested to me that I have an odd career, or that I might have any sort of gender difficulties. Actually, one person has suggested to me that I might do better at Rensselaer as a woman, since he felt our new president favors women. *If* that is true, it is fine with me. I am long past worrying about whether I got *any* position because I am a woman. I am past it because I now understand that almost everyone who gets any position gets it for reasons which are not completely objective. Many people get positions because they know someone, or because they happened to be standing at exactly the right place at the right time, or because the person who is hiring them sees something in them that reminds them of themselves when they were young. I know that I have been rejected from positions for reasons which have nothing to do with whether or not I am a good scientist. Why should I worry if am accepted from the stack of qualified applicants because this time, someone would rather give the opportunity to a woman?

During the past year, I have had the privilege of serving as the Chair of the Physics Department Graduate Admissions Committee at Rensselaer. I want to share with you some of the things I have read in letters of recommendation for women applying to our program this year, along with my thoughts as I read them. (I had to change a few words in some of them to hide the identities of the applicants.)

"First, the important thing needing emphasis is that she is the most diligent of all my students and has done research excellently based on her sound theory background though she is a girl."

This is an example of an advisor who cannot see past the gender of his graduate students.

"Miss X often mentioned that in order to be a true physics worker, one needs to cast aside some enjoyment and cultivate intensive interest and strong belief in physics. Her passion for physics distinguished her from her classmates and has won her appreciation from me."

This is an example of an advisor who thinks that physics is difficult and that students should work hard, regardless of whether or not they are enjoying themselves. Although I agree that working hard does help to bring about a successful career, the idea that someone should work hard and not enjoy themselves does not. The work that one does in physics should be a work of joy. Otherwise, it truly is not worth doing. The idea that someone should endure pain now in hopes that in the future they should have power and comfort only brings to my mind only visions of fraternity hazing and the cycle of child abuse. I do not know whether it is environmental or genetic, but women do not socialize in the same hierarchical way.

"This girl is honest and modest. Being accommodating, she gets along well with her classmates. She is also a girl with mercy and a kind heart. When she was a Junior, she volunteered to serve as a blood donor."

"She gets along well with almost all the students and teachers. This is due to her amicability and nice-heartedness. She is ready to help others ...."

I have also been surprised by how many women have recommendation letters which describe them as "beautiful." These statements are nice, but do not bring to mind a physics researcher so much as a wife, daughter, or best friend.

"I know her from an outstanding young man, her husband, Dr. X, who is an Associate Professor in the Physics Department now. As far as I know, she and her husband have done a lot of interesting work in terahertz optics."

Nowhere in the rest of the application was her marital status ever mentioned. It is my opinion that unless there is a reason for us to know about the husband (for instance, the applicant would like us to look for a position for her husband as well), his existence is irrelevant. None of the letters for male students tell us about his wife's professional requirements, whether or not she is an asset to his career, whether she has any geographical preference we might like to know about, or whether she has any particular needs which might influence the likelihood that he would move to the area. We just look at the application and ask ourselves whether we would want this student in the program.

The idea of a recommendation letter is to distinguish the work of the applicant. If her collaborator had not been her husband, could the person who wrote this letter of recommendation

come up with anything illuminating to tell us about her individual abilities?

Now I must tell you some bad news. Although I was successful in admitting about the right number of graduate students this past year, and their distribution in ethnicity and physics specialty is about what we expected (not representative, but as expected), of the 14 students who will enter graduate school in physics at Rensselaer in 2001, not a single one is female! I was somewhat disappointed by this. Last year we had three out of 17. When I look at the numbers, I see that 12 out of 80 of our applicants are women. Only 4 out of 40 of those we admitted to the program were women. All things being equal, there should have been 6. Okay, I told myself. These are small number statistics, and maybe not all things were equal. Then I looked at the waiting list. We put people on the waiting list if we thought they were qualified to enter the program, but we just couldn't accept them because we would have too many students. Of the 11 students on the waiting list, 3 were female.

Although these small number statistics do not prove anything, I am worried that even putting a woman in charge of admissions, even if that woman is *me*, doesn't guarantee that women will receive equal consideration with men. Worse, we could be seeing the effects of real collateral damage sustained by women as they go through the system. If women do not ask questions, their misconceptions are never straightened out. If their energies are sapped by their own insecurities and a system that seems unfriendly, they cannot be as receptive to learning the material. If women are not given tasks with the assumption that they are capable, no one might ever find out that they are.

Does it make a difference to the recruiting and retention of women to have women in positions of authority? Well, it doesn't change the world overnight. But I know that the coming of a woman president to Rensselaer honestly made me more comfortable taking a position in this historically male-dominated institution. I hope that in our institution, the glass ceiling is dissolving, and that over time our female students will begin to feel more self-confident and open.

Before I close, I would like to add a brief comment. When I was a girl my father told me that the marital system where the husband works outside the home and brings in money and the wife takes care of the house and has primary responsibility for the kids was a good system. It was not the only system, however. In many ways, it would have been easier for me to have followed that path. But I would not have been following the path that I wanted to follow. The system we have in place to educate new physicists and place them on career paths is a system which has been successful in creating physicists. I do not believe it is the only system, either. Paving paths for young physicists which match the paths of those who have come before them works only to the extent that the young physicists are like the ones before them, and that the world that they live in and opportunities afforded them are similar to those of previous generations.

*

Kristy Dyer is in her last year of Ph.D. research at North Carolina State University and will be starting an NSF Fellowship in Fall 2001 at National Radio Astronomy Observatory. She is an alumna of Mt. Holyoke. She studies thermal and non-thermal X-ray emission in supernova remnants. This article originated in a talk given to the 2001 Invitational Conference on K-12 Outreach from University Science Departments sponsored by the NCSU Science House and the Burroughs Welcome Fund.

What You Don't Know Can Hurt You: Illogical dimensions to being a woman scientist.

By Kristy Dyer

FOR THE NEXT FEW MINUTES I want to you regard me as an escapee from the hard-science zoo. I'll report on the conditions, hopefully finishing before the zoo-keepers note my absence and come after me with nets. The following is my own experience and it should not be assumed that I speak for all zoo animals.

Kirsty Dyer

Certain people (men and women) are drawn to the hard sciences (by which I mean math, physics, chemistry and engineering). The scientific ideals we picked up as we struggled through our classes were worthy and principled. We are detached, we are skeptical, we offer our results up for peer review, our truths can be replicated.

There is a long and noble history of science — we trace our roots back to Aristotle (the use of logical deduction) and Galileo (experiments under controlled conditions). Newton decreed nature could be described by mathematics (although he had to invent the mathematics to do it). Descartes gave us Cartesian reductionism, which among other things specifies that causes can be unambiguously separated from effects. Bacon laid the ground rules for the scientific method, recording observations in an impartial and totally objective way without prior prejudice.

I want to point out that none of the above actually prohibits women or minorities from succeeding in science. This is a noble and high-minded set of rules for making sense of the universe. This is why I fell in love with science. This is unfortunately not the way science is done.

It turns out that science has a culture. Karl Popper, a philosopher of science, found that in fact it is not possible to be totally objective: decisions about what is a relevant observation are influence by background assumptions — in fact, context matters!

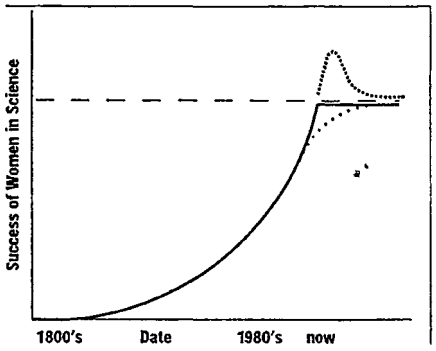
"Paradigms Lost" by John Casti gives the following simple example. A series of numbers is given {1, 2, 4, 8} where the "correct" continuation of the series depends on the context: 16, 32, 128 (doubling), or 9, 11, 15 (differences in original sequence), or "Who Do We Appreciate!" which is certainly correct if the context is high school sports.

A second example comes from a former professor of mine. In an effort to bring everyday science examples to a "physics for poets" class, he gave the following test question: "Why are stop signs red?" To which a liberal art student answered, "So they can be easily seen." He felt that this showed up the impossibility of trying to teach non-science majors. (What he wanted was an answer that discussed wavelength and reflected and absorbed light). It seemed to me that the student had answered the question perfectly correctly in a different context.

Thomas Kuhn unearthed further evidence of this unexamined scientific culture. Most scientists have heard of (and some have actually read) "The Structure of Scientific Revolution," which delineates the ways in which scientific progress is made, not according to or within the accepted scientific method, but in a wider scientific culture where scientific paradigms are broken, and then reformed.

Figure 1

Perceived Progress of Women in Science



In order to understand where these majestic rules break down, I've plotted the perceived "Progress of women in science" (Figure 1). This figure has several interesting characteristics. It begins in the 1800's (ancient history) with zero women in science. It then shows the situation improving as rapidly as possible (sounds like exponential growth to me) with equity either having been obtained in the last decade (independent of whatever decade we are in) or equity about to be obtained (before I reached graduate school at the very latest).

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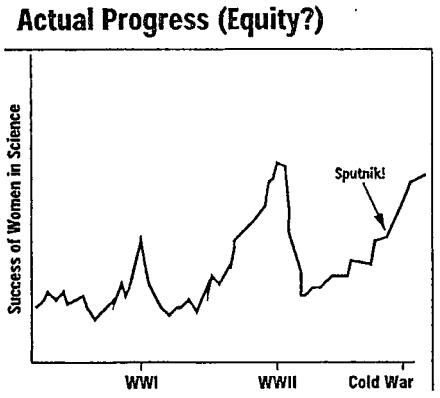
http://www.aas.org/~cswa/Status

Illogical Dimensions *continued from page 11*

One thing becomes immediately clear — if you think the progress has been an exponential growth curve, clearly an overshoot (indicated by the dotted line) is likely — which explains why so many men in science think we have overshot equity and women are now clearly being preferred for jobs. A second possible curve (the lower dotted line) is the "S" curve beloved of population studies — we are asymptotically approaching equity. If you believe this curve, any complaints about current problems are picking nits, since the problems are so much smaller than in the past and clearly progress is being made as fast as (scientifically) possible.

Unfortunately the real progress of women in science is much more like Figure 2 and there are consequences for mistaking it for Figure 1. To start, the figures disagree over whether inequities have been fixed. Figure 1 also shows monotonic progress, implying that women in science never lose ground once gained. It's a daunting reality, not only that we at times have lost ground, but that the number of women working in science is less affected by education and public policy than by an outbreak of war (Sputnik was mentioned as major motivating factors in the careers of the first three speakers: Marye Ann Fox, Jane Butler Kahle and Jack Rhoton!). I don't know where to put the equity line in Figure 2. If you taught at the university during WWII, and were laid off when the men returned from the front, had you (momentarily) achieved equity?

Figure 2



The perceived graph has no historical women scientists, where as the actual graph shows that there have always been a few women in science. This leads to what I'll call the "Marie Curie Effect." Often we are called upon to list famous scientists:

Einstein
Newton
Feynman
Marie Curie
Stephen Hawking

(Odd isn't it how some scientists have two names and some only one?). We put Marie Curie on the list because we want to include role models for women and we don't want women's contributions to be forgotten. However, from glancing at this list I would deduce that 20% of the great historical achieving scientists were women. We are over-representing women, and therefore minimizing their absence and the issues that lead to that absence. When we make these lists we never mention all the women of Marie Curie's cohort who were unable to become scientists. This also leads to another fallacy — we like to emphasize that our hero-scientists have overcome enormous obstacles to succeed — Einstein being a Jew in Nazi Germany, Newton banished from the University due to the plague, etc. However when we over-represent women in science we suggest the following: *"If women succeeded historically in producing important scientific work despite enormous obstacles (such as not being allowed access to higher education!) then if women today are not succeeding it must be because their work is not of sufficient scientific importance."*

In fact Marie Curie is not statically significant in her time. These obstacles (as well as more subtle ones) were effective in reducing the number of women scientists from N to basically zero. [Ed. Note: c.f. See "Science Has No Gender" by Sethanne Howard, STATUS January 2000.]

Here I am going to take an unpopular stance. I am going to sing the praises of mediocrity. We will not have achieved equity in science until mediocre women achieve tenure — women who have solid but uninteresting research programs, have brought money into the university and are (just) adequate. Most people in favor of the inclusion of women in science argue that women make great scientists. I want to point out that most men in science don't qualify for the list of greats I've listed above. If anything, the scientific record has shown that progress is made on the back of lots of mundane, dull labor, as well as new ideas from unexpected sources.

The scientists who are concerned about women in physics and astronomy talk a lot about the "leaky pipeline" (Table 1). Each part of the pipeline should be flowing into the next, but instead is leaking girls/women. You could set the "necks" at different levels but I've chosen a few common ones. Where I could find data I've placed the ratio of women/men for Physical Sciences + Engineering on the left and the percentage of women/men in Astronomy (my field) to the right. The early stages, marked with "?" are guesses on my part.

The problem with this pipeline concept is that there is, in fact, no "flowing" going on. Rather, it is a "snapshot" of populations at any given

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Illogical Dimensions *continued from page 12*

moment, the easiest data to gather. The girls interested in science are not the same population that becomes tenured faculty — no one has ever done this longitudinal study.

There are consequences for mistaking a "snapshot" pipeline for a longitudinal study. It places the largest responsibility for the leaks at the "soft" end — home life, kindergarten, grade school, high school. These are areas not in the responsibility realm of hard scientists. It lets hiring committees, tenure committees and conference organizing committees off the hook. Effectively they say, "If we were given anything to work with we could include women but until there are women to include, we are just doing our job."

At some level we do recognize this is a "snapshot". Often we think it fully explains the number of tenured women professors — there were simply fewer girls interested in science in the 1960's when they were young. There is however no scientific evidence to support that thesis — I suspect that the 1960's pipeline was narrower at the beginning but also less efficient than the present pipeline at "leaking" women at later stages. I encourage someone to refute this!

We are encouraging girls in science — where do we expect them to go? The problem is complex — the closer a woman comes to being a model scientist, accepting without question the scientific culture I enumerated above, the less prepared she will be to cope with the inequities she will encounter. The culture as it stands simply does not allow the following questions to be posed, let alone answered: *Is peer review biased? Are men and women in science evaluated by different standards? Is there a culture to science that works to exclude women?*

There are probably more questions I should be asking but as a model scientist I can't even formulate them. I do know that when I talk to girls interested in science, undergraduates and potential graduate students, I have to admit I lie to them — I tell them how wonderful science is and I point to the one or two (statistically insignificant) women at the top to prove it can be done. I don't tell them how many women drop out of graduate school or how dismal the employment statistics are for women who do graduate.

There are many desires and plans to include women and minorities in the sciences — these admirable solutions don't exist in a vacuum — it's worth examining the paradigms they assume as context. There are several standard paradigms:

- The deficit model. Girls are like boys but they lack certain things. Programs that try to give girls hands-on experience in labs, because they often get less experience than boys are operating within a deficit model.
- The difference model. Sarah Berenson's Girl Math program operates within a difference model. She believes that girls are different than boys, no less talented, and that by changing the context of math problems we can involve girls in math relevant to their values.

I believe we need to move to a climate model if we are going to understand and address these problems. Both the deficit model and the difference model take as a standard the way boys/male scientists do things. Both put girls/women scientists under the microscope to examine why they are different. This is like finding a three-legged frog in a polluted pond and taking the frog back to the lab for an interview, demanding "Why did you grow an extra leg?" without ever examining the pond, the environment.

There have been quite a few studies of women in science — I think it is time to study men in science — the default culture, and to make that culture the responsibility of the scientists. Women, who make up less than 5% of tenured physics faculty, are not in a position of power. It is a fact that we are not the ones granting tenure, directing research funds or guiding hiring committees — we cannot solve the problem of the lack of women in science by studying women

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Table 1

Percentage of Females in the Physical Sciences and Astronomy

Percentage of Females who...

	Physical Sciences	Astronomy
Are interested in Science (Pre-Junior High)	~50%?	~50%?
Are interested in Science (Post-Junior High)	~30%?	~30%?
Take High School Calculus	>20?%	>20%?
Graduate With a Science Undergraduate Major	47%	33% (physics)
Are in a Science Degree Graduate Program	45%	25%
Graduate with a Science Ph.D.	30-35%	20%
Are Tenure-track/Research Faculty	38%	18%
Are Tenured Faculty	11%	5%

Illogical Dimensions *continued from page 13*

in science because women in science don't actually have control over the problem.

I think until we do this — examine the underlying culture of the hard sciences we will not be able to place effective patches on the leaky pipeline. I worry that it's dishonest of us to work so hard to patch the beginning, when even students who clear many hurdles, will simply be cannon fodder in graduate school. And I think we need to teach the culture of science to students at all levels — knowing the unspoken culture as well as that noble facade can provide them with the tools they will need to overcome barriers, barriers the statistics make all too clear. ❖

Further material on the culture of science and its effect on women:

"Women Science and Technology: A Reader in Feminist Studies" by Wyer et al. 2001, published by Routledge.

Statistics on women in science and engineering came from the NSF: http://www.nsf.gov/sbe/srs/nsf00327/pdfstart.htm (2000).

Statistics on women in astronomy came from STATUS June 2000 http://www.aas.org/~cswa/, and from a 1999 AAS survey which was reported in Bulletin of the American Astronomical Society 31, 1552 #121.01.

"...when I talk to girls interested in science, undergraduates and potential graduate students, I have to admit I lie to them – I tell them how wonderful science is and I point to the one or two (statistically insignificant) women at the top to prove it can be done. I don't tell them how many women drop out of graduate school or how dismal the employment statistics are for women who do graduate."

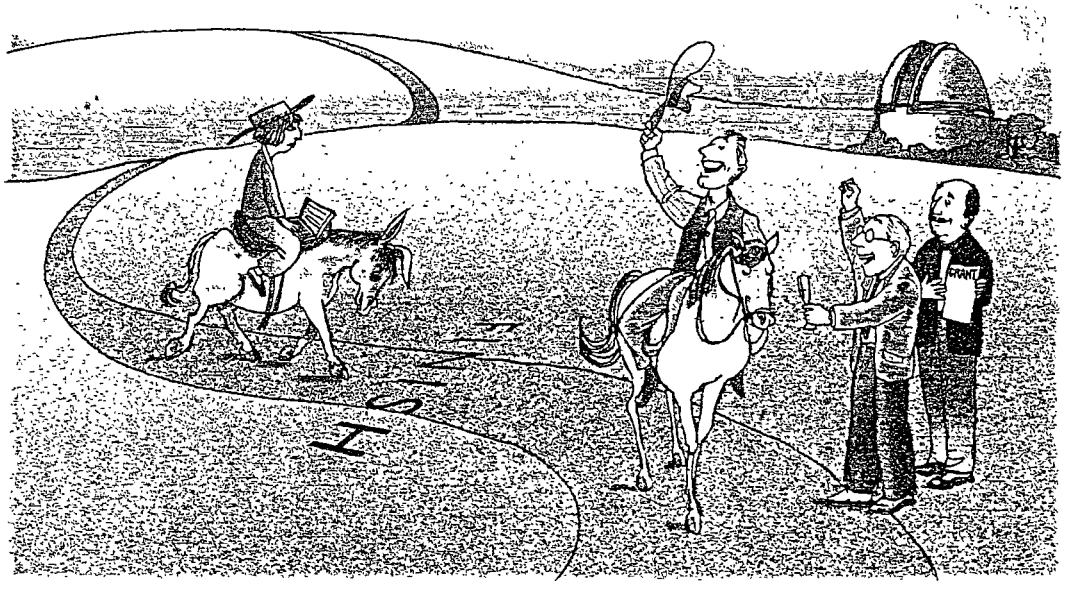

Illustration by Ann Feild

"You know, she tries, but he's just so much FASTER than she is!"

eurostat **news release**

No 118/2001 - 8 November 2001

Women and science

Women hold less than one third of posts in higher education teaching and public research

While the proportion of female students is slightly higher than that of males in tertiary education in the **EU** (52% of women in 1999), a strong disparity exists in higher education teaching and public research. Women make up only one quarter of higher education professors and represent less than one third of public researchers.

In connection with the Conference on "Gender and Research"[1] organised by **Direction General Research** in Brussels on November 8 and 9, **Eurostat, the Statistical Office of the European Communities in Luxembourg** publishes today a report[2] based on data collected by members of the Helsinki Group on women and science[3].

The higher the teacher grade, the fewer female professors

Women are strongly under-represented in higher education teaching. In average in the **EU**, the share of female professors was 26% in 1999. This proportion was particularly low in **Germany** (9%), **Ireland** (12%), **Belgium** (14%), and **the Netherlands** (15%) while the highest shares were recorded in **Finland** (36%) and **Sweden** (33%).

More detailed data on higher education teaching personnel show that there was a general trend across the EU to have a larger proportion of women at the lowest grade. While 32% of assistant professors were women, the share fell to 28% in the grade of associate professor and to 11% for full professors. In every Member State, there was a lower share of women at the senior level of full professor: from 5% in **Ireland** to 18% in **Finland**.

Proportion of women in public research and higher education teaching in 1999

	Research		Higher education teaching (all grades mixed)
	Higher education sector[4]	Government sector[4]	
EU	**28%**	**34%**	**26%**
Belgium	14%	:	14%
Denmark	27%	31%	21%
Germany	19%*	:	9%**
Greece	44%	37%	22%*
Spain	37%*	36%*	32%*
France	29%	31%	29%
Ireland	46%	25%	12%**
Italy	28%	29%	28%
Luxembourg	:	28%	:
Netherlands	15%	:	15%
Austria	26%**	32%**	23%**
Portugal	43%*	53%*	:
Finland	37%*	:	36%*
Sweden	33%	:	33%**
United Kingdom	36%*	:	24%*

* 1997 data, ** 1998 data, . not available

Disparity less pronounced in medical, social sciences and humanities research

Regarding research, a weak representation of women is also observed in the **EU**. In 1999, 66% of the researchers in the Government sector and 72% in the higher education sector were men. Only a few countries had a female presence higher than 40% (**Ireland**, **Greece** and **Portugal**, all in the higher education sector) and only in one case (**Portugal**), was parity reached, with 53% of women in Government sector.

When broken down by field, the proportion of female researchers in the **EU** higher education sector ranged in 1999 from 12% in engineering and technology to one third in medical sciences, social sciences and humanities. In all countries, the lowest rate was systematically recorded in the engineering and technology field. The rate was particularly weak in French speaking **Belgium** with 2% of women. In all Member States, except **Denmark**, the highest rate was observed in medical sciences or social sciences and humanities. In these two fields, the proportion of women was above 50% in **Ireland** and the **United Kingdom**.

Proportion of female researchers by field of science in 1999*
(Higher education sector only)

	Natural sciences	Engineering and technology	Medical sciences	Agricultural sciences	Social sciences and Humanities
EU	**23%**	**12%**	**33%**	**28%**	**32%**
Belgium	11%	2%	13%	8%	21%
Denmark	23%	13%	32%	43%	32%
Germany*	14%	9%	30%	25%	27%
France	29%	17%	21%	:	38%
Ireland	44%	25%	68%	:	55%
Italy	31%	13%	23%	24%	36%
Netherlands	8%	6%	17%	11%	20%
Austria**	18%	9%	32%	31%	33%
Portugal*	48%	29%	46%	41%	47%
Finland*	29%	19%	48%	37%	45%
Sweden	29%	18%	39%	41%	36%
United Kingdom*	31%	14%	55%	40%	54%

* 1997 data, ** 1998 data, not available

Remarks Belgium: French speaking only, France. natural and agricultural sciences grouped together, Ireland numbers are too small in agricultural sciences, United Kingdom: no data available for humanities

1. This conference will seek to give new momentum for the integration of the gender dimension in European research, particularly in setting up the European Research Area It will bring together political decision-makers and representatives of the scientific community.
2. **Eurostat, Statistics in focus, Science and Technology, No 7/2001, "Women in public research and higher education in Europe".**
3. *The Helsinki Group on women and science gathers national civil servants involved in promoting women in scientific research* It was established by the European Commission in November 1999 in Helsinki. The Group covers Member States and Associated countries
4. The **government sector** includes public departments, offices and other bodies supplying community services, other than higher education.
   The **higher education sector** comprises universities, colleges of technology and other institutes of post-secondary education, research institutes, experimental stations and clinics controlled by or associated with higher education establishments.
   Research in **business enterprises** is not covered by the above statistics

AMERICAN INSTITUTE OF PHYSICS

AIP REPORT

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By Rachel Ivie
Katie Stowe

AIP Publication Number R-430

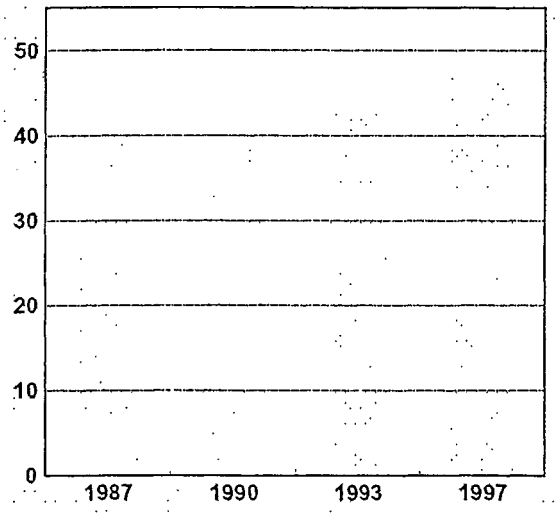
June, 2000

Women in Physics, 2000

Highlights

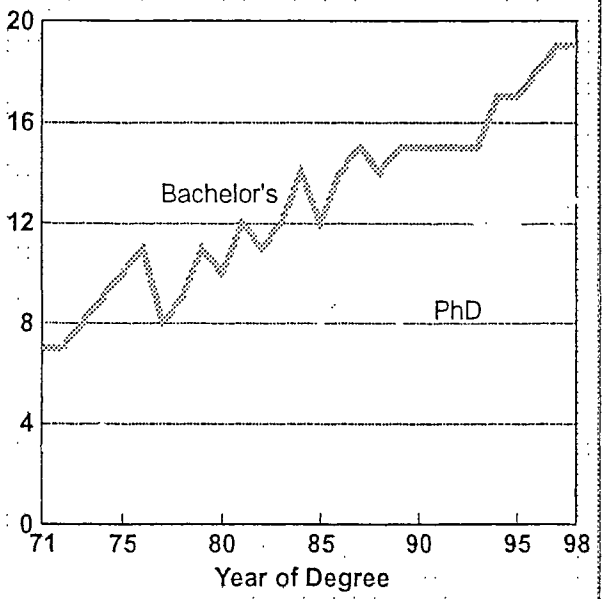
- An increasingly large number of girls have some exposure to physics by taking it in high school. By 1997, almost one-half of high school physics students were girls **(Figure 1)**. About 400,000 girls take high school physics each year.
- Women's participation in physics decreases with each step up the academic ladder. For example, more than two-fifths of high school physics students in 1993 were girls, but women earned less than one-fifth of bachelor's degrees in physics five years later **(Figures 1 and 3)**.
- Although women now earn more than one half of all bachelor's degrees in the U.S., physics is not attracting women as quickly as other fields, including life sciences, chemistry, and engineering **(Figures 4 and 5)**. Compared to other fields, women are sorely underrepresented in physics at both the bachelor's and PhD levels **(Figures 4, 5, 6, 7, and Table 1)**.
- Twenty U.S. physics departments (excluding women's colleges) had more than 40% female bachelor's degree recipients during the five academic years 1994-98. This report lists these departments as well as women's colleges that grant bachelor's degrees in physics **(Tables 2 and 3)**.
- The proportion of women teaching physics decreases as academic rank and level of the department increases **(Table 4)**. However, the percentage of women faculty members at each rank is at least as high as the percentage of women earning PhDs at various points in the past. The report also lists PhD physics departments that had four or more women on faculty **(Table 5)**.
- Salary differences between male and female members of AIP's Member Societies are nonexistent, except among two groups **(Figures 12 and 13)**.
- Observers have offered various explanations for women's poor representation in physics. Many of the explanations do not hold up in light of available data. It is possible that women still experience subtle discrimination leading them away from physics and that women choose careers that are less clearly linked to physics.

Figure 1. Girls as a Percentage of Total Enrollment in High School Physics Over Time



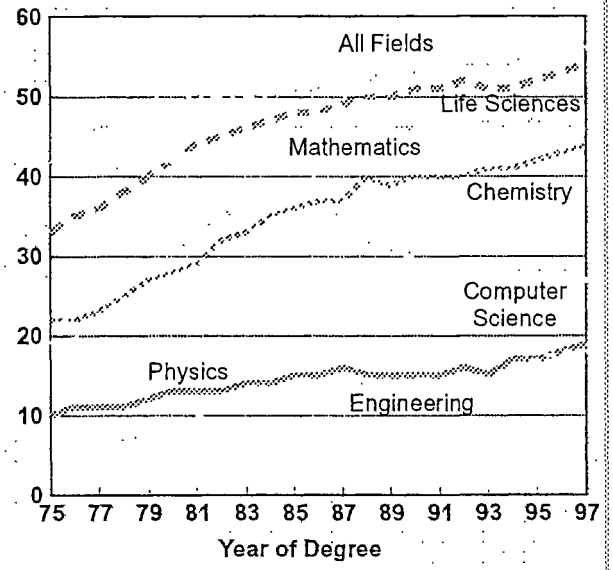
Source: Neuschatz & McFarling, *High School Physics for a New Millennium*, AIP.

Figure 3. Percent of Physics Bachelor's and PhDs Earned by Women, 1971 to 1998



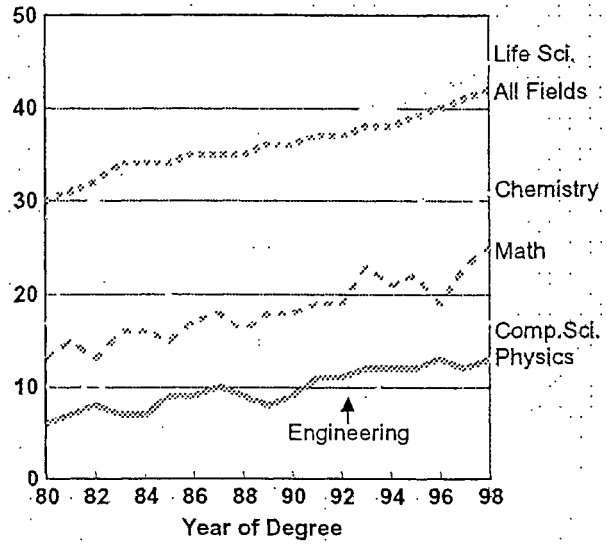
Source: Mulvey & Nicholson, *Enrollments and Degrees Report*, AIP.

Figure 4. Percent of Bachelor's Degrees Earned by Women in Selected Fields, 1975 to 1997



Sources: National Center for Education Statistics, and Mulvey & Nicholson, *Enrollments and Degrees Report*, AIP.

Figure 6. Percent of PhDs Earned by Women in Selected Fields, 1980 to 1998



Sources: National Research Council, National Opinion Research Center, and Mulvey & Nicholson, *Enrollments and Degrees Report*, AIP.

Table 1. Number of Women Receiving Degrees in Selected Fields, 1950 and 1998

	1950	1998
Physics PhDs	6	201
Math PhDs	11	297
Chemistry PhDs	37	695
Engineering PhDs	1	769
Physical Science PhDs	58	1600
Social Science PhDs	122	3838
Life Science PhDs	113	3876
Education Doctorates	160	4120
Doctorates in All Fields	613	17856
M.D.s*	346	6450
Law Degrees*	288	17531

*These data are from 1956 and 1997. The 1997 data are the most recent data available from the Department of Education.

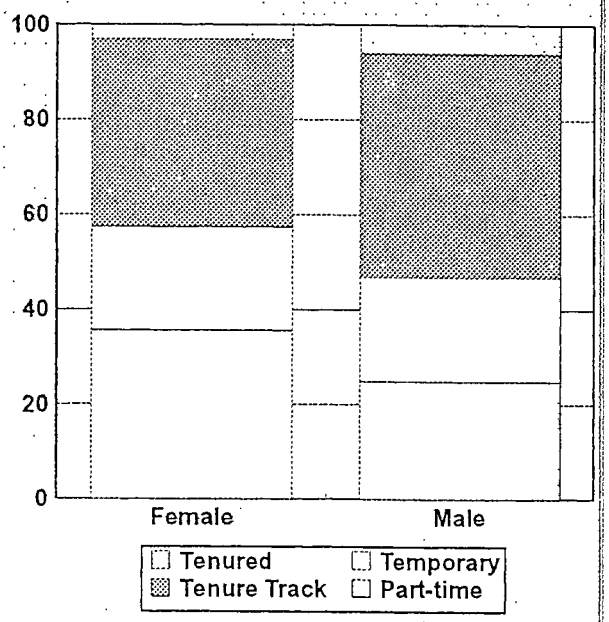
Sources: National Research Council, National Opinion Research Center, and National Center for Education Statistics.
Compiled by: AIP Statistical Research Center.

Table 4. Percent of Faculty Positions in Physics That Were Held by Women, 1994 and 1998

		1994 (%)	1998 (%)
Academic Rank	Full Professor	3	3
	Associate Professor	8	10
	Assistant Professor	12	17
	Other Ranks	8	13
Type of Department	PhD-Granting	5	6
	Master's-Granting	7	9
	Bachelor's-Granting	7	11
	Total	6	8

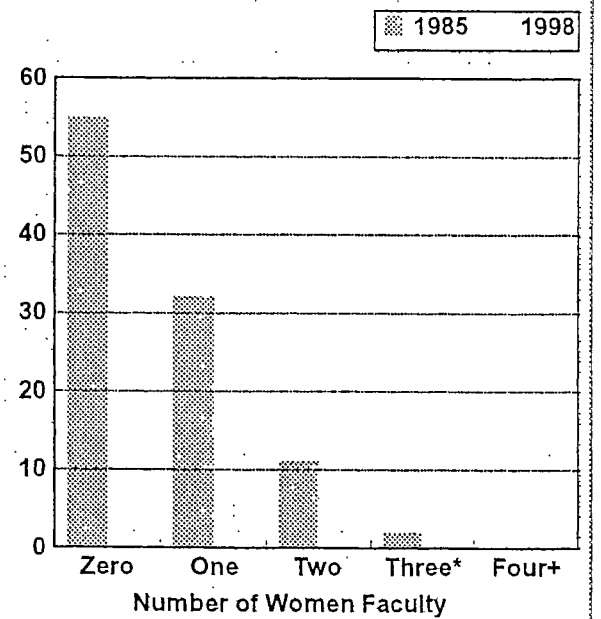
Sources: Blake, *1993-94 Academic Workforce Report,* AIP, and Ivie & Stowe, *1997-98 Academic Workforce Report*, AIP.

Figure 9. Employment Status and Gender of New Physics Faculty Hires for 1997-98



Source: Ivie and Stowe, *1997-98 Academic Workforce Report*, AIP.

Figure 10. Number of Women Faculty in PhD Physics Departments, 1985 and 1998



*For the 1985 data category, "Three" represents three or more.
Source: Ivie and Stowe, *1997-98 Academic Workforce Report*, AIP.

SOURCE: http://www.astro.su.se/sas/popast/Birgitta.html

Birgitta på Nya Uraniborg

PROFILEN

av Björn Stenholm (text och bild)

Birgitta Nordström, svensk-dansk astronom, blev känd för en bredare krets tidigare i år. Hon och hennes forskarlag hade funnit en mycket gammal stjärna, vars ålder var jämförbar med hela universums. Beviset bestod av uran. Hon arbetar nu på Lunds nya palatsliknande astronomihus, som därför kunde kallas Uraniborg!

När jag cyklar iväg genom Lund för att göra denna intervju med Birgitta Nordström formligen vräker regnet ner. Jag kommer fram till den nya Institutionen för astronomi vid Lunds universitet mer lik en dränkt katt än en flygande reporter med kamera om halsen. Men trots regnet ska vi tala om stjärnor. När jag träffade Birgitta första gången var det i Stockholm,
på observatoriet i Saltsjöbaden, i början av 1970-talet. Då var vi båda forskarstuderande, hon i slutet av sin utbildning och jag just i början av min. Men redan då var hon sysselsatt med stora spektroskopiska undersökningar av stjärnorna i Vintergatan, den egna galaxen.

- Ja, och så har det faktiskt i stort sett förblivit, säger Birgitta. Jag har hela tiden under mina dryga trettio år som aktiv forskare sysslat med stjärnutveckling i Vintergatan och Vintergatans egen utveckling. Den främsta observationsmetoden för mig har varit spektroskopiska undersökningar i såväl låg som hög upplösning av stora stjärnmaterial, dvs tusentals stjärnor.

Men låt oss föralldel börja från början. Hur kom det sig att du hamnade bland astronomerna i Saltsjöbaden?
- Jag är från Södermalm i Stockholm, så avståndet till Saltsjöbaden var inget problem! Men som så många andra funderade jag på lärarutbildning. På den tiden fanns det en obligatorisk kurs i astronomi för lärare i naturvetenskapliga ämnen. Jag hade vid det tillfället lite tid över och kunde då gå en lite mer omfattande kurs än nödvändigt i ämnet astronomi, och då kom jag i kontakt med Stockholms observatorium och dess personal. Ämnet intresserade mig,
förstås. Det fick till följd att jag erbjöds sommarjobb där, och därefter fortsatte jag studierna vid observatoriet. Det blev först en fil lic 1970 och doktor blev jag 1975. Min handledare under forskarutbildningen var dåvarande docenten Lars Olof Lodén, som verkligen förstod att inspirera sina elever.

Men du lämnade egentligen Sverige tidigt och har väl egentligen inte återvänt (ännu) på riktigt?
- Ja, jag lämnade Sverige 1970, redan under forskarutbildningen och har sedan mest arbetat här under kortare besök. Jag träffade min blivande man 1972 i Provence, på det stora observatoriet där, och han är dansk astronom, Johannes Andersen heter han, så vi har mestadels haft Danmark och Köpenhamn som fast punkt i tillvaron. Där är också våra tre barn födda. Men astronomer är ju kända för att resa mycket och vistas på andra platser än hemmainstitutionen, och det har även vi gjort. Jag har räknat ut att jag har

arbetat och bott i inte mindre än sju länder, Sverige, Danmark, Schweiz, Frankrike, Kanada, Tyskland och USA. Därutöver har jag naturligtvis som många andra europeiska observerande astronomer flitigt utnyttjat de båda observatorierna i Chile, La Silla och Paranal.

Och nu är du tillbaka i Sverige, i Lund. Dags att stanna upp nu?
- Nej, inte alls, jag är gästprofessor här i Lund under en tid av två år, varav drygt ett har gått nu. Återstår alltså knappt ett år här. Jag bor fortfarande kvar i Danmark. Öresundsbron, som för övrigt invigdes samma dag som mitt arbete började här, underlättar resandet väsentligt. Men samarbetet med astronomer och fysiker här i Lund har varit mycket inspirerande, och jag skulle inte ha något emot att flytta hem till Sverige igen. Kanske vistelsen här kan bli ett första steg i den riktningen.

Men vi ska kanske återvända till de rent astronomiska problemen. Ditt namn blev ordentligt uppmärksammat i medierna i våras på grund av att du och dina medarbetare, som man sade, hade upptäckt universums äldsta stjärna. Inte illa! Hur var det egentligen med detta?
- Ja, så var det ju inte riktigt. Det finns ju ingen praktisk möjlighet att undersöka alla Vintergatans stjärnor i detalj, så därför kan man inte säga att man funnit den äldsta. Men vi hade onekligen funnit en av de allra äldsta, och åldersbestämningen gjordes med en spektrallinje från det radioaktiva grundämnet uran, det var nytt och sensationellt. Metoden
liknar den från arkeologin kända s k kol-14-metoden, men eftersom tidsrymderna är mycket längre i stjärnevärlden passar uranets halveringstid på 4,5 miljarder år perfekt in.

Men ni påstod ju också att stjärnans ålder var lika med universums ålder. Hur hänger det ihop?
- Vi kom fram till att denna stjärna tillhör de allra första stjärngenerationerna i Vintergatan, de låga halterna av tunga grundämnen tyder på det. Vintergatans ålder är därför inte mycket större än denna stjärnas, och vi antar att vår galax bildades tidigt i universums historia. Vi bestämde stjärnans ålder till 12,5 plus minus 3 miljarder år, alltså någonstans mellan 9,5 och 15,5 miljarder år. Då bör universums ålder inte vara mycket större än stjärnans, kanske högst en miljard år eller så.

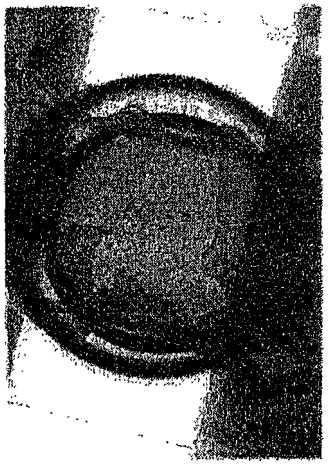
Redan innan du och din grupp publicerade dessa resultat var vår uppfattning om universums ålder ungefär så som din stjärnas med ungefär era felgränser.
- Jovisst, men finessen är att vår metod är helt oberoende av tidigare metoder för bestämning av universums ålder! Att den ger samma resultat innebär naturligtvis ett starkt stöd för att vår nuvarande uppfattning är riktig. Men visst, felgränserna är fortfarande stora, men de beror till stor del på bristande kännedom om atomfysikaliska data för de grundämnen
som studerats. Men detta är på väg att lösas. Här i det nya astronomihuset har fysiska institutionens atomspektroskopigrupp flyttat in, och de arbetar nu intensivt tillsammans med oss för att förbättra nödvändiga linjedata. Vi söker dessutom observationstid på Hubbleteleskopet för att kontrollera våra resultat även för andra grundämnen. Allt detta sammantaget kommer troligtvis att innebära att felgränserna kan sänkas till plus minus 1,5 miljarder så småningom, vilket kommer att bli en avsevärd förbättring.

Men detta är ju strålande! Universums ålder kommer tydligen under det kommande året att bestämmas i ett hus på Sölvegatan i Lund.
- Visst, säger Birgitta Nordström förtröstansfullt och strålar tillbaka.

Detektiv på grønlandsisen

Glaciolog Dorthe Dahl-Jensen er Danmarks første kvindelig professor i fysik nogensinde. De sidste mange år har hun boret i Grønland for at aflokke isen dens hemmeligheder om klimaets historie. Nu er hun begyndt på at kortlægge ismasserne ude i rummet og har fundet et nyt forskningsfelt, som hun kalder "eksklusiv grundforskning".

Af Annette Bjørg Koeller



Fra NGRIPs hjemmeside: De store flere tusinde år gamle iskrystaller ses tydeligt gennem et polarisationsfilter.

FORUM/20.11.2001 Når den nyslået professor i is fysik, Dorthe Dahl-Jensen, skal beskrive sin fascination af is og sit liv som glaciolog, siger hun med slet skjult begejstring:
- Det er, som om vi er detektiver, der prøver at finde fortidens klima!

Og sandt er det også, at hendes arbejde på Niels Bohr-instituttet kan beskrives som en blanding af historieskrivning, arkæologi og detektivarbejde - en fascinerende rejse tre kilometer ned i den grønlandske indlandsis' indre for at kortlægge klimaet næsten 130.000 år tilbage.

Hendes øjne lyser entusiastisk, når hun fortæller om tilfredsstillelsen ved at bore en dyb iskerne, tage den klare, blanke is op, som man ikke kan aflæse noget umiddelbart af og så bruge teknik og særlige metoder til at liste klimainformationerne ud af den frosne cylinder.
- Det er også skægt, at vores forskningsfelt med at bore iskerner og undersøge dem er meget, meget specialiseret og ikke særligt stort. Man kan planlægge, hvad man gerne vil måle, tage op i felten og måle det, tage hjem og behandle data, konkludere fra data og bagefter skrive en artikel, som er lødig. At man kan følge processen hele vejen igennem og ikke kun gøre én del, som jeg ser, de gør på nogle af de store forskningsområder, hvor man står for en enkelt lille del, måske et måleapparat, er meget privilegeret, siger hun.

Det er hér, passionen ligger for Dorthe Dahl-Jensen; selv at have fingrene nede i det kolde materiale, der skal fortælle os om fortiden og give nogle fingerpeg om fremtiden.

I dette kalenderår er der ellers sket meget for den 43-årige forsker, der har gjort det svært for hende at finde tid til decideret forskning. Udover at blive Danmarks første kvindelige professor i fysik - (som er en fem-årig udnævnelse), er hun også blevet leder af det nye Planetcenter, som ligger i et sidehus til Rockefeller-bygningen bag Rigshospitalet.

Her møder FORUM hende i et bart og á propos ret køligt kontor, hun gerne trækker sig tilbage til, når hun vil have fred til sine projekter - projekter, det har ligget lidt tungt med på det seneste.
- Jeg har været klemt de sidste par år. Der har ikke været meget tid til at forske, og det har jeg været ked af. Lige for tiden arbejder jeg på at få tiden til at forske, for det er dét, jeg godt kan lidt. Det er meget vigtigt for mig, og det vil jeg ikke holde op med. Der er rigtig mange dage, hvor jeg går hjem og har lavet noget administrativt, og det er selvfølgelig også konstruktivt og godt, men hvor jeg ikke har fået lavet noget af mit eget. Men i de sidste par måneder er jeg heldigvis kommet i gang igen, siger Dorthe Dahl-Jensen og tilføjer grinende:
- Det er jo et spørgsmål om, hvad man skal forsømme, ikke?

Planetcenteret rummer forskere fra Niels Bohr-Instituttet og Dansk Rumforskningsinstitut, alle sammen folk, der beskæftiger sig med planeter på en eller anden måde.

Dorthe Dahl-Jensen har også gjort den bevægelse med. Fra at kigge nedad og ind i jordens og isens indre har hun udvidet sit forskningsfelt opad i verdensrummet, hvor vand og is også findes i store mængder på planeterne, men interessen er forholdsvis ny.

Første gang hun formulerede noget om det, var i 1999 i ansøgningen til Freja-programmet (Female Researchers In Joint Action), en opfindelse af den daværende forskningsminister Jytte Hilden, der øremærkede i alt 78 millioner kroner til forskningsprojekter, der skulle ledes af kvinder.

Hun fik også fem millioner kroner til sit projekt "Ice in the Planetary System - The Life of Ice", der gik ud på at lave modeller af isen på Mars og Jupiters måne Europa.

Gennem de sidste fem år har rumprogrammerne udviklet sig sådan, at mange små sonder har været i kredsløb ved forskellige planeter og målt dem i en detaljegrad, som ikke har været kendt tidligere. For eksempel er

Mars blevet kortlagt med en nøjagtighed på en meter, stort set lige så nøjagtigt som Jorden, og det samme gælder for nogle af de andre planeter og måner.
- Og det gør, at der kommer nogle informationer ned, som man kan rive i - det er virkelig konkrete facts om planeter. Og derfor kan geofysikerne begynde at bruge de metoder, vi har brugt til at studere Jorden, til også at studere planeterne, uden at det er ren spekulation, for sådan har det jo lidt været tidligere. Man kunne stille modeller og teorier op men ikke sige, om det var falsk eller sandt, så der var en grænse for, hvor langt man kunne gå. Den grænse bevæger sig udad nu, fordi man lige pludselig ved noget om planeterne, fortæller Dorthe Dahl-Jensen.

Også andre faggrupper får nye forskningsfelter foræret af sondernes oplysninger fra rummet, og det er baggrunden for Dorthe Dahl-Jensens idé og initiativ om at skabe et slagkraftigt Planetcenter, hvor forskerne med tiden skal se stort på faggrænserne og indgå i tværfaglige projekter.

At det nu er lykkedes, og at hun sidder som spydspids på centeret, ser ud til stadig at komme bag på hende:
- Jeg er slet ikke den, der har mest erfaring i at arbejde med planetforskning her, fordi det er noget nyt, jeg er begyndt på. Derfor var det også lidt overraskende, at jeg lige pludselig skulle være leder og blive professor indenfor de her ting, for jeg føler mig lidt som en novice i forhold til de andre. Men jeg tror, jeg har en masse muligheder for nytænkning, som er godt for alle, også for de gamle i gårde, og min opgave er især at gøde jorden og få nogle samarbejdsprojekter i gang.

Hun tilskriver Freja-programmet en stor del af æren for, at hun i dag har fået sit professorat og lederstillingen på Planetcenteret, selvom hun i begyndelsen var skeptisk overfor det faktum, at midlerne var øremærkede til kvinder. Der var en nervøsitet for, at hele programmet skulle blive betragtet som andenrangs og uden faglig status - men i stedet endte det med, at utroligt mange kvinder søgte, og at det blev prestigefyldt at få del i midlerne.

- Jeg må indrømme, at jeg nok ikke havde fundet på at søge om projektet med is på planeterne, hvis det ikke havde været for Freja-programmet, for jeg er jo indlejret i en god glaciologisk gruppe, hvor jeg var tilfreds med min forskning i iskerner, siger Dorthe Dahl-Jensen, som tror, at karrieren fik et afgørende positivt skub af Freja-programmet.

- For hvis jeg ikke havde taget næsen ud af busken og bare havde været en del af glaciologgruppens arbejde, havde jeg nok heller ikke fået professoratet eller lederstillingen heroppe, så det har betydet rigtigt meget for mig. Der er kommet utroligt meget godt ud af det for mig, siger hun.

Forskningen i is på planeterne var og er i første omgang drevet af fascination og nysgerrighed. Direkte samfundsnyttigt kan man ikke sige, det er, og Dorthe Dahl-Jensen tror ikke, at vi kan lære noget om Jordens klima ved at kigge på Mars.
- Det er eksklusiv grundforskning, og gudskelov er der også plads til det ind imellem. Der er sværere at lave fri grundforskning nu end tidligere. Langt flere penge bliver kanaliseret ind i projekter, som er mere styret og har decideret samfundsnyttig værdi. Jeg føler mig privilegeret, men jeg synes også, der skal være plads til det. Man ved jo ikke, hvad man opfinder. Hvis man sætter alle pengene ind dér, hvor man ved, hvad man opfinder, har man jo låst sig ude fra nye idéer, og det ville være forfærdeligt.

Fascinationen som drivkraft vender Dorthe Dahl-Jensen hele tiden tilbage til, og den var der allerede, da hun meldte sig som spejder i 10-11 års-alderen. Det er en gren af spejderiet at kaste sig over klatring, fjeldvandring og skiløb, og hun deltog også i korpsets gletscher-kurser og syntes, at is simpelthen var flot.

Men det var først i 3.g. i gymnasiet, da hendes fysiker-far tog et lektionskatalog med hjem til hende fra universitetet, at hun fandt ud af, hvad faget glaciologi gik ud på.
- Jeg kan stadigvæk huske, at der stod i fagbeskrivelsen, at man skulle have noget felterfaring, inden man blev færdig, og jeg tænkte: "Fint, det er lige mig". Så kunne jeg få brugt matematikken og fysikken til de ting, jeg rigtigt godt kunne lide: Isen og naturen.

I 1981 - i det fjerde studieår - fik hun sin felterfaring, da hun deltog i en iskerneboring i Grønland, og først da følte hun, at hun havde valgt det rigtige fag. Lige siden har der været mange arbejdsophold deroppe, og det er nærmest blevet en livsform for hende og hendes mand, der også er glaciolog, at tage børnene med til Grønland flere måneder om sommeren, når iskerneboringerne foregår.

Den lille pige på to år og drengene på otte, 13 og 16 bor med forældrene på forskerhotellet KISS i Kangerlussuaq ved Søndre Strømfjord, hvor Dorthe Dahl-Jensen og hendes mand så skiftes til at være hos børnene og tage op på indlandsisen, hvor NGRIP-boringerne har fundet sted siden 1996.

Hun regner hurtigt ud, at familien har været i Grønland 12 somre gennem de sidste 16 år, og børnene nyder det og kommer på mange ture, også via andre forskerprojekter på stedet. Selv synes hun ikke, at det er nogen straf at være i Grønland om sommeren, fordi vejret er "pragtfuldt" - klart, solrigt og 15 grader varmt. Kun de mange myg kan der klages over.

De to ældste drenge har allerede bekendtgjort, at de også vil være forskere, mens den otte-årige gerne vil bo i Søndre Strømfjord og have et arbejde med at tage bagagen ud af flyene! Rejseaktiviteten kan dog også blive for meget for børnene, der godt kan sige fra, når de synes, familien

rejser for tit. En spørgsmål fra moderen, om ikke familien skulle tage en uge sydpå efter jul, udløste ingen jubelråb, men den bestemte reaktion: "Åh, vi gider ikke rejse, skal vi ikke bare blive hjemme, koster det ikke også mange penge?"

Nu ved familien dog, at der ikke bliver nogen Grønlandsfærd til næste år, og Dorthe Dahl-Jensen nyder allerede tanken om at få en dansk sommer for en sjælden gangs skyld.

Årsagen er, at NGRIP-ekspeditionen skal have nyt udstyr, et særligt bor til varm is, for at afslutte projektet, og det kan først være klar til sommeren 2003.
- Isen er 3080 meter dyb, hvor vi borer nu, og vi er nede i 3001 meters dybde, dér hvor vi sluttede i sommer. Vi fik kun boret 70 meter, og boret satte sig fast fem gange. Vores problem er, at isen er ved at blive varm nede ved bunden, så vi nærmer os smeltepunktet af is. Når man borer, udvikler man varme; så kommer der vand, og så sætter boret sig fast. Vi kan godt få boret frit, men løber ind i de samme problemer hele tiden - at det sætter sig fast. Når vi får det nye udstyr med, skal vi nok få boret ned til bunden, men det går langsomt, siger hun.

Jo længere, man borer ned, jo ældre is kommer man selvfølgelig igennem. Men lagene bliver også tyndere, fordi den nyere is og sne trykker ovenfra. Forskerholdet har allerede boret sig igennem isen fra vores nuværende varme mellemistidsperiode, gennem istiden, der gik forud, og er nu nede ved den forrige mellemistidsperiode - den såkaldte eemtid - der mindede meget om vores tid, rent klimatisk. Faktisk er man lige på det punkt, hvor eemtiden er ved at køle ned til istid, og det er interessant for forskerne, fordi det ligner dét, vi kan forvente af vores klima engang i fremtiden.

Isen har årlag, ligesom træer har årringe, og det gør det muligt at få et væld af præcise detaljer om klimaets udvikling, en slags isens årbog, kunne man kalde det.

- Det er meget spændende at have en ismasse, hvor vi har en årlagsopløsning på godt en centimeter, hvor vi med vores moderne målemetoder på is kan gå ned og se på de enkelte år: Hvor varmt og koldt var det? Hvornår stormede det? Hvornår kom støvet ind? Var den årgang præget af vulkanudbrud? Hvordan ændrede klimaet sig? Så det er utroligt spændende, og hvis vi skal lære noget om, hvad der skal ske i fremtiden, er vi simpelthen nødt til at se på, hvordan klimaet har opført sig tidligere.

Og hvad kan glaciologerne så sige om fremtidens vejr?

Ja, den globale opvarmning er i gang, og man spår, at det kan ændre den cyklus, der ellers har eksisteret i to millioner år, med istid og mellemistid i en regelmæssig vekselvirkning.

- Vi er inde i en meget lang mellemistid, og hvis vi får lavet en global opvarmning, er det spørgsmålet, om klimaet vil tippe og gå ned i istid igen. Det ved vi stadig for lidt om til at give et ordentligt svar på. Men folk er generelt enige om, at vi ikke står overfor en ny istid nu, heller ikke hvis vi ikke havde lavet global opvarmning, siger Dorthe Dahl-Jensen.

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HISTORY AND INSPIRATION

CONTRIBUTIONS OF 20th CENTURY WOMEN TO PHYSICS

People often ask - why aren't there more women physicists? There are two easy answers to this question. One is that institutions of higher learning, scientific laboratories and institutes denied women access in past centuries. Consequently there were very few women who could do physics before the 20th century. As women breached barriers to higher education, they became major players in astronomy, mathematics, and physics. Many of these women are unknown even though their contributions are well known. From the beginning of the 20th century, women have made original and important scientific discoveries often working unpaid and more often under-acknowledged. So the second answer to the question posed above is a repost - namely, there are more female physicists than most people know about! To show this, we present for your viewing a documented archive of information about 20th century women who have made original and important contribu tions to physics. It is on the World Wide Web where you can see it by pointing your browser to

Maria Goeppert Mayer (1906-1972)
Nobel Prize 1963
UCSD

http://www.physics.ucla.edu/~cw p