WOMEN IN CRYSTALLOGRAPHIC COMPUTING

Power Hour

at the European Crystallographic Computing Forum Mieres 2018

Women crystallographers

"It takes a very special breed of scientist to do this work ... it is an area of science in which women dominate."

- Judith Howard, 2004

Female crystallographers are (and always were) a minority:

14% internationally

(Maureen Julian, using the World Directory of Crystallographers)

How many other women do you know in crystallographic computing?

number	counts
0 – 10	13
11– 20	3
21– 50	3
more	0

Historical aspects

Computing as a women‘s discipline

Famous developers in crystallography

1967 Cosmo article

"It's just like planning a dinner," explains Grace Hopper (...)
"You have to plan ahead and schedule everything so it's ready when you need it. Programming requires patience and the ability to handle detail. Women are 'naturals' at computer programming."

The Computer Girls

BY LOIS MANDEL

A trainee gets $8,000 a year ...a girl "senior systems analyst" gets $20,000—and up! Maybe it's time to investigate....

Ann Richardson, IBM systems engineer, designs a bridge via computer. Above (left) she checks her facts with fellow systems engineer, Marvin V. Fuchs. Right, she feeds facts into the computer. Below, Ann demonstrates on a viewing screen how her facts designed the bridge, and makes changes with a "light pen."

Twenty years ago, a girl could be a secretary, a school teacher . . . maybe a librarian, a social worker or a nurse. If she was really ambitious, she could go into the professions and compete with men . . . usually working harder and longer to earn less pay for the same job.

Now have come the big, dazzling computers—and a whole new kind of work for women: programming. Telling the miracle machines what to do and how to do it. Anything from predicting the weather to sending out billing notices from the local department store.

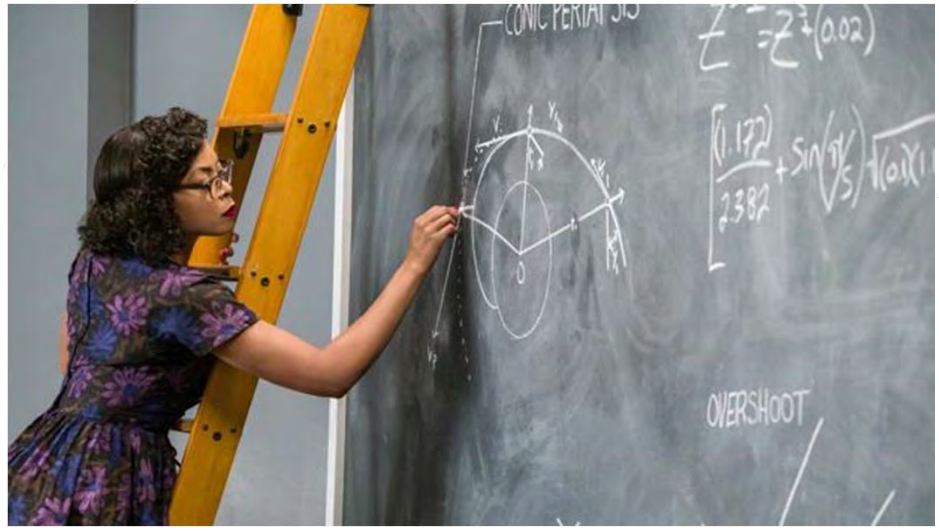
And if it doesn't sound like woman's work—well, it just is.

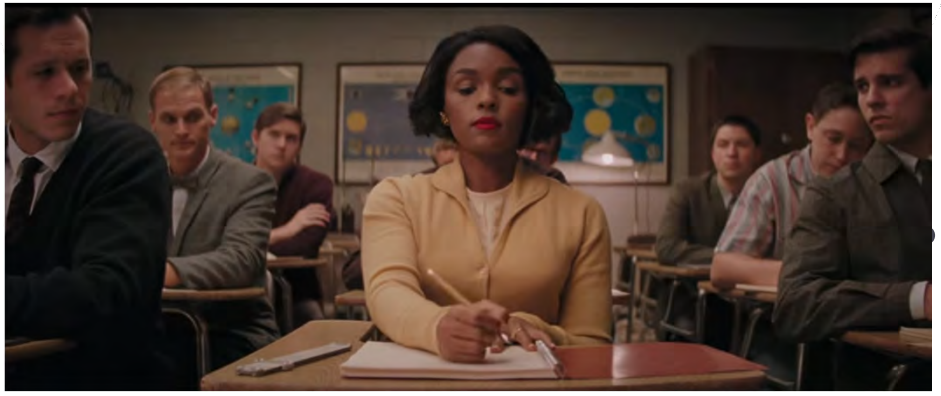
("I had this idea I'd be standing at a big machine and pressing buttons all day long," says a girl who programs for a Los Angeles bank. I couldn't have been further off the track. I figure out how the computer can solve a problem, and then instruct the machine to do it."

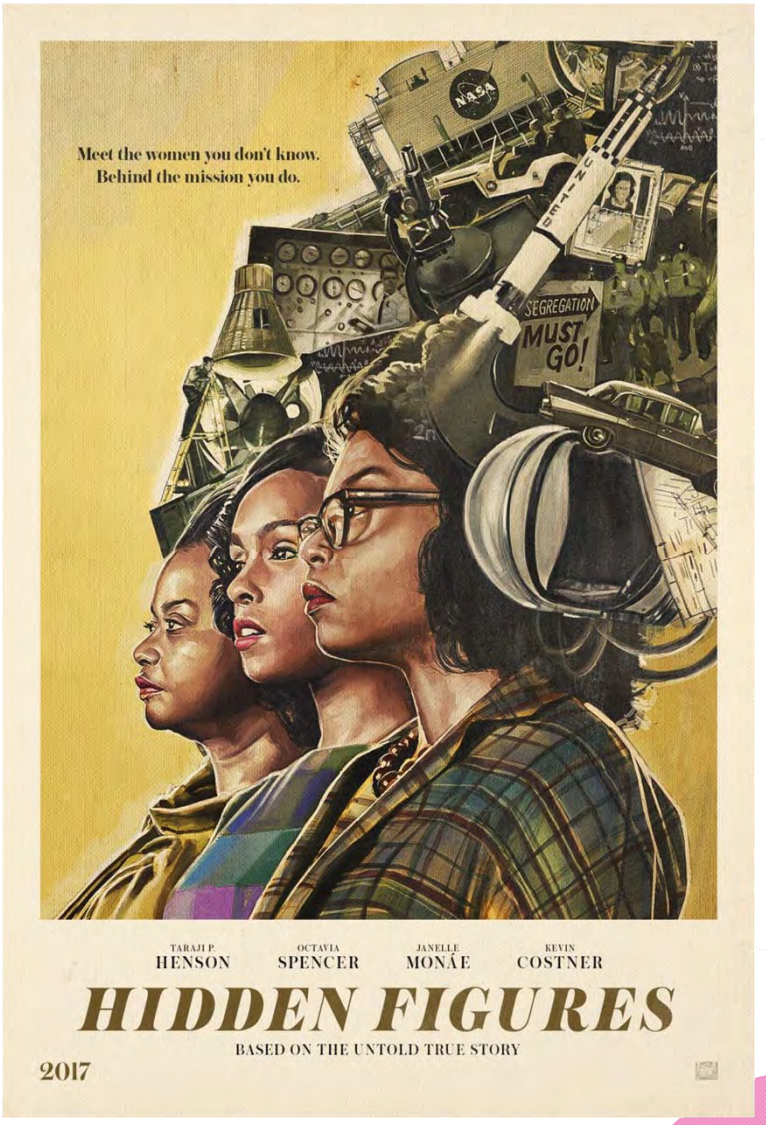
"It's just like planning a dinner," explains Dr. Grace Hopper, now a staff scientist in systems programming for Univac. (She helped develop the first electronic digital computer, the Eniac, in 1946.) "You have to plan ahead and schedule everything so it's ready when you need it. Programming requires patience and the ability to handle detail. Women are 'naturals' at computer programming."

What she's talking about is *aptitude*—the one most important quality a girl needs to become a programmer. She also needs a keen, logical mind. And if that zeroes out the old Billie Burke-Gracie Allen image of femininity, it's about time, because this is the age of the Computer Girls. There are twenty thousand of them in the United *(cont. on page 54)*

Hidden Figures







History

Kathleen Lonsdale: Confirmed the structure of the benzene ring, International Tables

Dorothy Hodgkin: structures of penicillin and vitamin B12

Rosalind Franklin: DNA photography

Isabella Karle: Application of direct methods to crystals

Olga Kennard: founded and ran the CSD

Eleanor Dodson: CCP4

Jane Richardson: Depiction of proteins, Molprobity

Many people attribute this to a positive attitute in crystallography towards hiring and support the careers of females by professors. Children in the lab are not unheard of.

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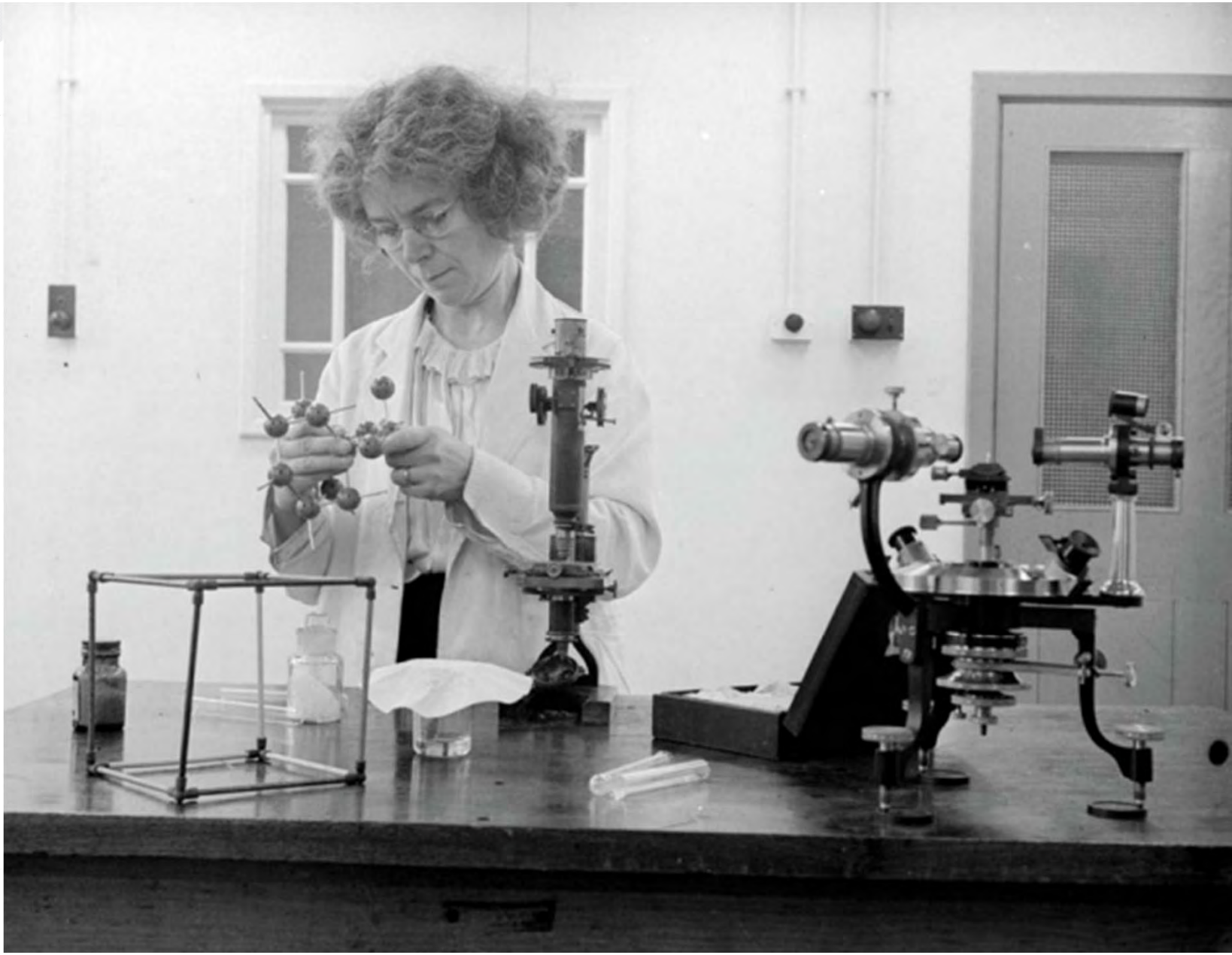
History



Numbers declining?

Some statistics

CCP4 Developers' meeting: numbers

year	participants	women	percentage
2013	49	7	14%
2014	58	10	17%
2015	45	7	15%
2016	56	7	13%
2017	54	6	11%
2018	49	5	10%

ECACOMSIG meetings

year	participants	women	percentage
Warwick 2013	39	8	21%
Rovinj 2014	40	5	13%
Freudenstadt 2015	24	5	21%
Mieres 2018	35	8	23%

Explanations?

And all my questions....

Confidence issues...

Somerville College May 17th, 1931

My dearest Mummy and Daddy,

(...)

A few days ago Dr. Joseph wrote to me to say that he had asked Professor Lowry about the possibility of my doing X-ray work on crystals – and whether it was a good thing. (...) And all that sounded very nice - really excellent just then – since the X-ray work would be useful in absolutely anything I decided to do ever afterwards and yet if I did not do it now – I probably should not have the chance again. But at the moment I'm feeling quite appalled at the prospect.

There will be such a fearful lot of work – and mathematics – involved. And I was just beginning to rejoice so much in the idea of a nice quiet organic research that would involve no brain whatsoever. As it is, it will be pure brain work – I'm just shivering in my shoes – terribly afraid I really am trying to force too much on one poor little brain that is almost non-existent already.

(...)

Of course, if I can really do it it will be rather priceless...

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Confidence issues...

Only 56% of the women in the STEM sectors in Europe feel confident that they are in high demand; 67% of men do.

“Just do it!
A guy would never say 'Am I good enough?' — they automatically think they are.”

- Irmgard Sining

Unconcious bias

Result from **role expectations** (example: A conference participant...)

Research findings:

Parents rate the math abilities of their daughters lower than parents with sons who perform identically well in school

- College faculty are less likely to respond to inquiries about research opportunities if the email appears to be from a woman as opposed to an identical email from a man
- Science faculty are less likely to hire or mentor students they believe are women as opposed to men

What to do:

- Accept it
- Identify likely situations (stress, anger, multitasking...)
- Analyse your bias and where it comes from

My questions:

- What aspect of crystallographic computing are you interested in?
- Do you have female colleagues?
- Have any of them left the field?
- Where did they go?
- Did female role models play a role for you?
- Why do you like computing?
- What do you not like about computing?
- What are the problems you encountered?
- How can we have more females in this field?