Wikipedia Page – Helene Kulsrud


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Taking her BA in mathematics (Smith College in 1953 - summa cum laude) and astronomy (MA, University of Chicago, 1954), Helene (Laney) Kulsrud spent most of her career as a computer scientist. When Laney was in college, there were no graduates in computer science: the first department of computer science was not formed until 1962 at Purdue University. [1]

In 1956-57, Laney was the Head Programmer for the Educational Testing Service. In that position, she worked on statistical application of computers and pioneered the use of digital computers for reporting scores on the SAT college entrance examinations. [2]

As a member of the technical staff at the David Sarnoff Research Center in Princeton (RCA Laboratories) [1958-1965] she combined her interest in mathematics and astronomy. For example, she wrote elegant, efficient programs for solutions of differential equations [3]. She has also created a Meta Compiler System that produced a compiler for the earliest APL, and designed an interactive debugging language for the Spectra systems at RCA, a special language and programming system for simulating electronics optical devices. Her work earned her and her team awards including:

> RCA Laboratories Award for Outstanding Work in Research for the development of high-speed digital computer techniques useful in the design of electron guns (Presented in 1960).
>
> RCA Laboratories Award for Outstanding Achievement, Presented to Helen E. Kulsrud for team performance shared by Leonard J. Berton, John T. O'Neil Jr., and Thomas M Stiller in simulation of the Spectra 70 computers, prior to their construction, by programs for the RCA 601 (Presented in 1965).

During a brief stint as a research associate at Yale University [1965-1966], she developed a general-purpose graphics language that could be used on multiple graphics devices [4].

Portability of software and algorithms was a recurring theme in Laney's work.

In 1968 when she joined the Communications Research Division (CRD) of the Institute for Defense Analyses in Princeton, supercomputers were delivered with only very primitive operating systems, assemblers, and compilers. The team of researchers at

CRD, which included Laney, wrote compilers, assemblers, operating systems, and even new programming languages to make efficient use of each particular computer's hardware [5].

Since 1975 she has been in charge of the design and implementation of a new language IDAL, for system programming and mathematical applications in the course of this work she produced a portable compiler that runs on the CEDC 6600 and 7600 and CRAY I computers, producing code for these machines and for the data general eclipse computers.

For the Control Data Corporation CDC-6600, Laney developed interactive debugging Tools, including HELPER, to help programmers speed up code development. She also developed a new metacompiler, extending earlier designs at CRD that allowed extensions to the debugger and other system software to be added quickly to the system [6].

For the Cray-1 in the 1980s, a language called IDAL was developed by Laney and Rick Schultz that retained features of prior languages, but included support for more complex data structures, array operations, and subroutines [7]. The language suited mathematical programmers so well that it was in use for decades.

Laney was a long-time member of the Cray User Group (CUG), organizing meetings, serving as an officer, and president from 1985-?. This group shared software, developments, improvements, and suggestions for future hardware for Cray supercomputers.

In the 1990s, Laney worked on many aspects of data mining from sorting to mathematical algorithms for accessing and classifying data [8] xslaney.wiki.txt.

An area of long-term interest to Laney was the development and porting of efficient subroutines. Even a basic subroutine such as sorting could be improved by tuning the algorithm to the computer hardware. At a Cray User Group meeting in 2003, Laney gave an overview of work in this area showing the improved speed achieved for sorting on five different computer architectures. [9]

In addition to her work in computing, Laney Kulsrud was the Founding Chairperson and continued to run and guide what became The Princeton (Opera) Festival, in Princeton, New Jersey, from 2003 until her retirement in 2019. Laney helped the Princeton Festival offer a music festival of highest quality, that it would have an impact on Princeton and the area, and most of all, it would be financially sound. Laney later become the Festival

Treasurer and Chair of Lectures and Special Events, she has worked tirelessly up to the present day with the Princeton Public Library on a program of the highest quality, as well as on expanding the Festival's own programming.

In 1986 Laney was named in "300 Women - YWCA Princeton"

Source Documents

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[7] "IDAL Reference Manual," H. E. Kulsrud, R. D. Schultz and R. R. Knight, III, Working Paper, Institute for Defense Analyses, Princeton, N.J., July 1979 (cited in "A modular operating system for the Cray-1," JC Huskamp, Software: Practice and Experience, 1986 - Wiley Online Library. https://doi.org/10.1002/spe.4380161202)

[8] "Mathematical Methods for Mining in Massive Data Sets", HE Kulsrud, in Astrophysics and Algorithms: a DIMACS Workshop on Massive Astronomical Data Sets, 1998. https://ui.adsabs.harvard.edu/abs/1998asal.confE...9K

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