

Judith Gamora Cohen

Oct. 2010

University Degrees:

BA Radcliffe College, 1967

MS Caltech 1969

PhD Caltech 1971

BS (Civil engineering) U of Arizona 1977

Teaching and Research:

University of California at Berkeley - Miller fellow 1971-1974

Kitt Peak National Observatory - Assistant Staff Astronomer, 1974-1979

Caltech, Associate Professor of Astronomy, 1979 - 1988.

Caltech, Professor of Astronomy, 1988 - present

Caltech, Kate Van Nuys Page Professor of Astronomy, 2005 - present

Society Memberships:

American Astronomical Society, International Astronomical Union

Honors and Awards:

Fullam Award of the Dudley Observatory

Caroline Herschel Distinguished Lecture, Space Telescope Science Institute, 3/2006

Cecilila Payne-Gaposkin Distinguished Lecture, Center for Astrophysics,
Harvard University, 5/2011

Selected Service for Caltech:

Founder, Caltech Recycling Center, ~1985

Chair, Committee on Public Events, 2003 - present

Chair, Committee for Upperclass Admissions, 2006 - 2008

Member, Science Steering Committee, Keck Observatory, 2001 - 2004, 2009 - present

Member, Science Advisory Committee, Thirty Meter Telescope Project, 2004 - present

Selected Service for the Astronomical Community:

Member, Webber Award Committee for the AAS, 2001 - 2002, Chair, 2002 - 2003

AURA Oversight Committee For Gemini Observatory, 2005 - 2011

Oversight Committee for Spitzer, 2006 - present

Selected Major Instrument Development and Design Projects

Low Resolution Imaging Spectrograph (First light instrument for Keck Observatory),
J.B.Oke, J.G.Cohen and their Caltech-based engineering team, J.G.Cohen – PI of LRIS
since 1994

MAGIQ guider update project at Keck, 2004 to present, project scientist

Major Scientific Contributions – Judith Cohen – Nov. 2010

- First detailed models of the integrated light optical and infrared emission of old composite stellar systems as a function of metallicity based on detailed evolutionary tracks, with inputs based on extensive study of individual stars in Galactic globular clusters. These were applied to the Milky Way globular cluster system, to clusters in the Magellanic Clouds and in M31, as well as to elliptical galaxies. Demonstration that luminous elliptical galaxies are old and metal-rich, often with super-solar abundances. First demonstration of key role new field of infrared photometry can play in determining characteristics of composite stellar systems, and that the integrated light of old stellar systems from the visual to 2.3μ is well understood. (Aaronson, M., Cohen, J.G., Mould, J. & Malkan, M., 1978, ApJ, 223, 824; Frogel, J.A., Cohen, J.G. & Persson, S.E., 1983, ApJ, 275, 773)
- Together with J.B.Oke, led a team of Caltech-based engineers to design and build the Low Resolution Imaging Spectrograph, one of three first light instruments for the Keck Observatory. PI of LRIS since 1994. LRIS is still heavily used at the 10 m Keck I Telescope. (J.B.Oke, J.G.Cohen, M.Carr, et al, 1995, PASP, 107, 375)
- Discovery of gravitational settling and radiative levitation among hot horizontal branch stars, both important for detailed stellar and solar evolutionary calculations, including reconciling helioseismology vs solar abundances as well as Big Bang nucleosynthesis vs stellar Li abundances. (B.B.Behr, J.G.Cohen, J.K.McCarthy & S.G.Djorgovski, 1999, ApJ Lett., 517, L135)
- Led the Caltech Faint Galaxy Redshift Survey, the first systematic exploration of the Universe that reached back in time to $z \sim 1.1$, and provided more than 670

galaxy redshifts for objects in the Hubble Deep Field, discovered that large scale structure extends out to redshift 1, that star formation is downsized such that at the present epoch, low luminosity galaxies have high star formation rates while most high luminosity galaxies show an old stellar population with low star formation rates, but at high redshift, luminous galaxies show high star formation rates, derived the merger rate among galaxies out to $z \sim 1$, their luminosity evolution, and the evolution of their spectral energy distribution. (J.G. Cohen, D.W. Hogg, M.A. Pahre & R. Blandford, 1996, ApJ Lett., 462, L9; Hogg, D.W., Cohen, J.G., Blandford, R. & Pahre, M.A., 1999, ApJ, 504, 622; Cohen, J.G., 2002, ApJ, ApJ, 567, 672)

- Demonstrated burning of C into N in all Galactic globular clusters examined extends from the RGB tip to below the main sequence turnoff, a key step in the development of the concept of multiple stellar populations in globular clusters. Further evidence for this from a detailed study of the Mg isotope ratios. (Judith G. Cohen, Michael M. Briley & Peter B. Stetson, 2005, AJ, 130, 1177; J.Melendez & J.G.Cohen, 2009, ApJ, 699, 2017)
- Leading the OZ project to study the local high-redshift universe through stellar archeology; datamining the Hamburg/ESO Survey to establish a large sample of extremely metal-poor halo field stars, determine their trends in metallicity for many elements. Establish their small deviations about trends consistent with uncertainties. Find a very small set of outliers, some of which represent new types of extremely metal-poor stars. Establish the first reliable determination of the metallicity distribution function at very low metallicity in the halo. (Cohen, Christlieb, McWilliam et al, 2004, ApJ, 612, 1107; J.G., McWilliam, A., Christlieb, N., et al, 2007, ApJ Lett., 659, L25; Schorck, T., Christlieb, N., Cohen, J.G. et al, 2009, A&A, 50, 817)

- The first demonstration that the inner halo globular clusters, and most of those in the outer halo, follow the abundance trends shown by halo field stars, and that the same holds for the most metal-poor stars in the classical dSph satellites of the Milky Way. Discovery of a significant population of stars with $[\text{Fe}/\text{H}] < -3$ dex in the classical dSph Galactic satellites, all of which sheds light on the early history of the Milky Way and the formation of the Galaxy through hierarchical mergers. (J. Cohen & J. Melendez, 2005, AJ, 129, 303; J. Cohen & J. Melendez, 2005, AJ, 129, 1607; Cohen & Huang, 2010, ApJ, 719, 931)

Seven significant publications (since 1995):

The Keck Low Resolution Imaging Spectrometer; *PASP*, **107**, 375, 1995 (authors J.B.Oke, J.G.Cohen, M.Carr, J.Cromer, A.Dingizian, F.H.Harris, S.Labrecque, R.Lucinio, W.Schaal, H.Epps, and J.Miller)

Caltech Faint Galaxy Redshift Survey X: A Redshift Survey in the Region of the Hubble Deep Field North, Judith G. Cohen, David W. Hogg, Roger Blandford, Lennox L. Cowie, Esther Hu, Antoinette Songaila, Patrick Shopbell & Kevin Richberg, 2000, *ApJ*, **538**, 29

Caltech Faint Galaxy Redshift Survey XIII: Spectral Energy Distributions for Galaxies in the Region of the Hubble Deep Field North, J.G.Cohen, 2001, *AJ*, **121**, 2895

Abundances in a Large Sample of Stars in M3 and M13, 2005, J. Cohen & J. Melendez, *AJ*, **129**, 303

The Rise of the AGB in the Galactic Halo: Mg Isotopic Ratios and High Precision Elemental Abundances in M71 Giants, 2009, J.Melendez & J.G.Cohen, *ApJ*, 699, 2017

The Chemical Evolution of the Ursa Minor Dwarf Spheroidal Galaxy, 2010, Cohen & Huang, *ApJ*, 719, 931

A Puzzle Involving Galactic Bulge Microlensing Events, 2010, Cohen, J.G., Gould, A., Thompson, I.B., Feltzing, S., Bensby, T., Johnson, J.A., Huang, W., Meléndez, J., Lucatello, S. & Asplund, M., *ApJ*, 711, L48