A Star is Born:  
Star Formation in the Milky Way and Nearby Galaxies

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Stars generate most of the light and nearly all of the elements necessary for life in the Universe; understanding how they form is critical for a complete picture of the Universe and our place within it. New stars are still forming today, and Western astrophysicists use many different techniques to study the formation of stars in many different environments.

Pauline Barmby uses the Spitzer Space Telescope to observe regions of star formation in nearby galaxies, including our neighbour Andromeda. The red color in the image below shows the infrared emission from filamentary interstellar medium in star-forming regions; the blue color shows the location of old stars.

Martin Houde and graduate students T. Hezareh and S. Chitsazzadeh study star formation in the Milky Way using observations at radio submillimetre wavelengths. This image of a region of intense star formation in the constellation Orion was taken at the Caltech Submillimeter Observatory, located on Mauna Kea, Hawaii. Observations like these allow us to determine the physical conditions (e.g., temperature, density, magnetic field strength) within the environments within which stars are born.

Shantanu Basu and graduate student W. Dapp use computer simulations to study star formation. The images below show a simulated “accretion disk” depositing gas onto a forming star at two different times (work carried out with postdoctoral fellow E. Vorobyov.)

Sarah Gallagher studies star formation in "compact groups" of galaxies using the Spitzer, Hubble, and Chandra Space Telescopes. Stephan's Quintet is a dramatic example of a compact galaxy group where gravitational interactions from multiple galaxy collisions have triggered star formation (as seen in blue on this multicolour Hubble Space Telescope image) on a grand scale. This type of environment most closely reproduces conditions in a young Universe when the bulk of stars were formed in massive galaxies.

Els Peeters and graduate student J. Otaguro focus their research on the light emitted by large carbonaceous molecules. These molecules are the most complex and most abundant molecules known in space and may well have played an important role in the prebiotic evolution of life. Hence, they are of tremendous importance for our understanding of the universe around us and our cosmic roots.

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