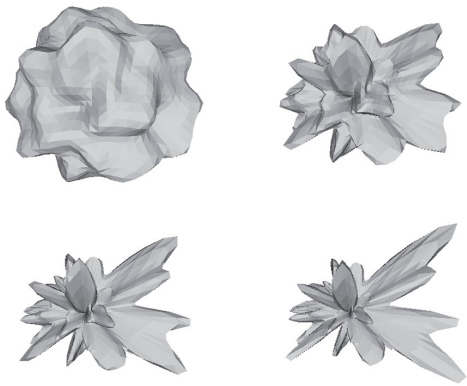
Astronomy & Astrophysics

HIGHLIGHTS: this week in A&A

Volume 504-3 (September IV 2009)

In section 6. Interstellar and circumstellar matter

"Laboratory-based grain shape models for the simulation of dust infrared spectra", by H. Mutschke, M. Min, and A. Tamanai, A&A 504, p. 875

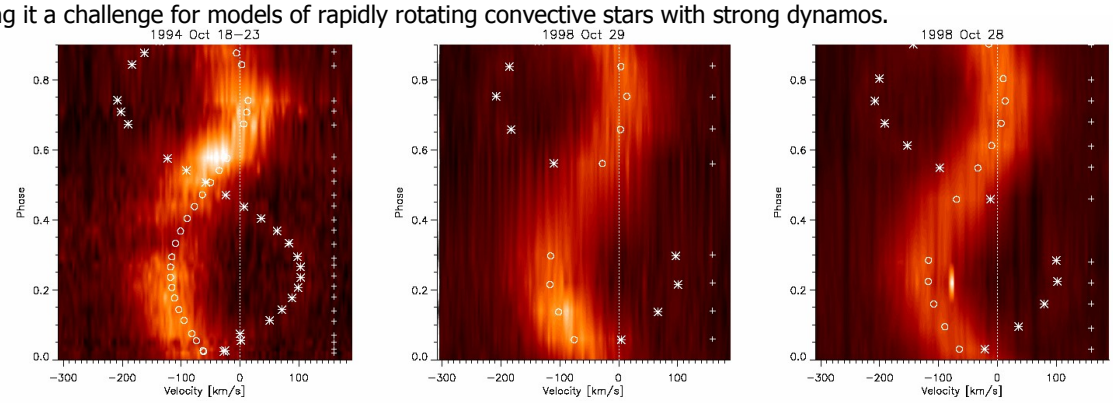


The morphology of interstellar dust has a strong influence on its observed spectra. Mutschke, Min, and Tamanai combine numerical and laboratory techniques in a statistical light-scattering mode that uses a distribution of form factors (DFF) to reproduce the infrared extinction spectra of sub-micron particles. The method allows a better comparison of the observed dust emission spectra with laboratory measurements.

In section 8. Stellar atmospheres

"Photospheric and chromospheric activity in V405 Andromedae. An M dwarf binary with components on the two sides of the full convection limit", by K. Vida et al., A&A 504, p. 1021

V405 Andromedae is a non-eclipsing active binary with components of 0.2 and 0.5 solar masses on opposite sides of the main sequence dividing line for full convection. This is a rare system, because only two are known with such low total mass and a high mass ratio of the components. Chromospheric emission (mainly Balmer), flaring, and prominence activity are observed, and the spectroscopy and photometry are discussed. Starspot models are compatible with both hot and cold active regions and high-latitude activity. The primary (more massive) star is larger than predicted by MS models with the relevant age, but the lower mass component fits the theoretical relation well, making it a challenge for models of rapidly rotating convective stars with strong dynamos.



In section 4. Extragalactic astronomy

"Cosmic star-formation history from a non-parametric inversion of infrared galaxy counts", by D. Le Borgne, D. Elbaz, P. Ocvirk, and C. Pichon, A&A 504, p. 727

It is now possible to observe and interpret the evolution of the star formation rate of the universe across the Hubble time. The authors use two independent data. First, they probe the star formation rate with number galaxy counts and cosmic background in the infrared light from Spitzer data, going deeper than previous works, and through an original non-parametric inversion technique, derive the range of all possible evolving luminosity functions. Second, they check that the integral of the star formation rate is consistent with the observed density of stars per unit comoving volume from z=0 to 3, taking stellar lifetimes and remnants into account. The results put interesting constraints on theoretical models, which should explain the observed "IR downsizing", i.e., that the average IR luminosity of the star-forming galaxies increases with redshift.