NOVA PhD position on The formation and early evolution of the most massive stars

Lex Kaper

Sterrenkundig Instituut Anton Pannekoek Universiteit van Amsterdam
Postbus 94249
1090 GE Amsterdam, The Netherlands

The mechanism by which the most massive stars form is poorly understood. Even though they are the most luminous objects in the Galaxy, their formation process and early evolution are obscured from view due to the tens to hundreds of magnitudes of (visual) extinction. Near-infrared imaging and spectroscopic surveys of high-mass star-forming regions reveal an amazingly complex interplay between the star formation process and the environment. K-band spectroscopy has resulted in the identification of young OB-type stars deeply embedded in (ultra-)compact H II regions, some of them still surrounded by a remnant accretion disk.

The key questions are: How are the most massive stars formed? What are the physical properties of the newly formed stars (photospheric parameters, rotational characteristics, radiation-driven wind, remnant accretion disks, binarity)? What is causing the lifetime problem (100x more UCHIIs than predicted by the current star formation rate)? Is the observed large range in spectral/photometric properties due to just a difference in mass (thus timescale), and/or does the environment play an important role?

Our strategy will be to extend the covered wavelength range of the many candidate young massive stars in our large survey down from the near-infrared into the optical (red) domain, thereby directly probing the stellar photosphere and wind. Optical/nIR spectra will be obtained within the VLT/X-shooter GTO program. With VLT/CRIRES the CO bandhead emission will be studied at high spectral resolution, allowing detailed modeling of the remnant accretion disk around the massive YSOs. A study of several star-forming regions has been carried out with VLT/SINFONI and Spitzer, to obtain a full census of their stellar content, ionized material, and outflows. One of the goals of the project is to relate the found results to observations obtained at longer wavelengths (e.g. VLA, ALMA) that likely probe an even earlier phase in the star formation process. Reduction, analysis, and interpretation of the obtained data, including the collection of new data, will form a major part of the project that should lead to a PhD at the University of Amsterdam. The position is offered for a period of 4 years and should be taken up in the Fall of 2009. The salary will be on the standard Dutch university scale.

Interested candidates should have a Master degree in astronomy or physics (or the equivalent). Applications should contain a curriculum vitae, a statement of research experience and interest, and the names of two references.

Attention/Comments: prof.dr. Lex Kaper

Weblink:
Email: L.Kaper@uva.nl
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