

Winds from massive stars: What are the real rates?

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Massive stars are among the key players that shape our Universe. The massive stars are truly cosmic engines, which power the evolution of matter in the Universe since the formation of first stars. The input of massive star winds into the interstellar matter is mostly given by two parameters: the wind mass-loss rate and the terminal velocity. While the terminal velocity can be directly measured with high precision, the mass-loss rates are strongly debated.

There are several observational tracers of the mass-loss rate across the whole electromagnetic spectrum. In the X-ray domain, the shape of the emission line profiles is affected by the wind density and may therefore be used to determine the wind mass-loss rate. Also the strength of the ultraviolet P Cygni lines depends on the mass-loss rate. The optical region can be reached from the ground, consequently the H alpha emission line is most typically used mass-loss rate indicator. The strength of the infrared recombination lines and radio excess is also closely related to the wind mass-loss rate.

Ideally, all these tracers should give the same mass-loss rate for the same star, which should also agree with theoretical predictions. However, this is not the case for many stars. The differences may amount to one order of magnitude. This is a serious problem for stellar evolutionary models and for the determination of the massive star feedback because even a factor of two difference in the mass-loss rates can have a drastic effect for the predicted (and actual) evolution of massive stars. The differences between the individual discordant determinations may be most likely attributed to the influence of the small scale wind inhomogeneities (clumping) on the diagnostics and on the predictions.

The aim of this special session is to bring together experts on the observational and theoretical studies of the massive star winds to establish the current status of the field of the mass-loss rate determination, discuss the critical uncertainties that are mostly connected with wind inhomogeneities, and propose the best strategies to provide more reliable mass-loss rate determinations to the astrophysical community.

Programme

- Prediction of hot star wind mass-loss rates from theory
- Observational hot star wind mass-loss rates estimation: from X-rays to radio
- Influence of inhomogeneities on the observational mass-loss rate indicators
- Indirect mass-loss rate estimations

Invited speakers

- Ronny Blomme (Royal Observatory of Belgium, Belgium)
- Maurice Leutenegger (NASA/GSFC, USA)
- Francisco Najarro (Centro de Astrobiología, Spain)
- Jon Sundqvist (KU Leuven, Belgium)
- Jorick Vink (Armagh Observatory, UK)

Scientific organisers

- Jiri Krticka (Masaryk University, Czech Republic)
- Nevena Markova (Institute of Astronomy with NAO, BAS, Bulgaria)
- Joachim Puls (Universitäts-Sternwarte, Muenchen, Germany)
- Jorick Vink (Armagh Observatory, UK)

Weblink: <http://eas.unige.ch/EWASS/session.jsp?id=SS10>

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