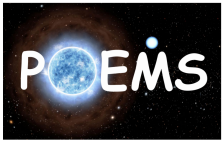
Physics of Extreme Massive Stars

Michaela Kraus

Astronomical Institute, Czech Academy of Sciences,
Ondřejov, Czech Republic



Physics of Extreme Massive Stars

Marie-Curie-RISE project
funded by the European Union

Outline

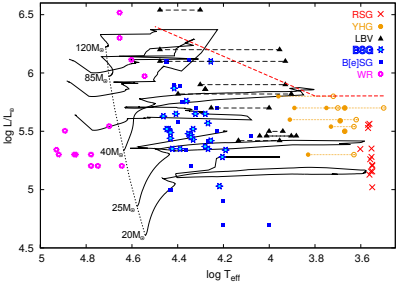
- How it began
- Objectives of POEMS
- Marie Skłodowska-Curie Staff Exchange
- Activities within POEMS

How it began

Stellar winds and mass loss

Circumstellar Environments

Stellar pulsations

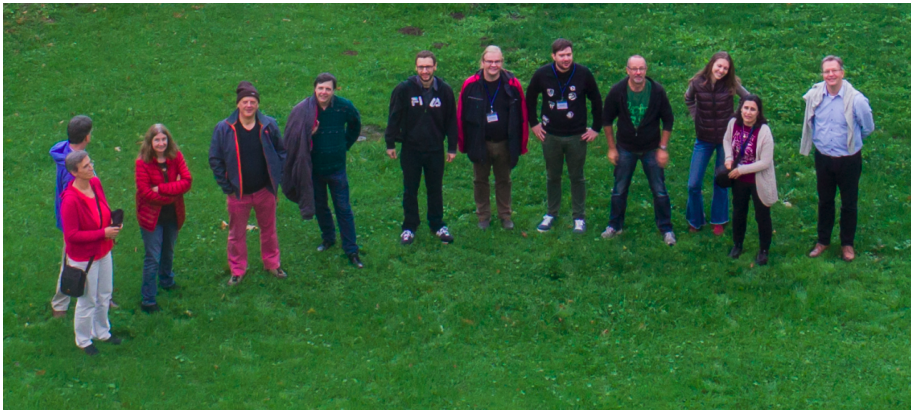


Influence of binarity

Evolutionary connections (if any)

Mass ejection mechanism(s)

Some enthusiastic scientists gathered for a meeting on **Massive Stars in Transition Phases** at Tartu Observatory, September 11-15, 2017, to discuss about most urgent questions in massive star research and to share ideas about how to address them



After 3 days of sharing latest insights in the state of knowledge in the diverse scientific fields, and 2 days of very intense discussions:

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Let's get funding for a collaboration project !!

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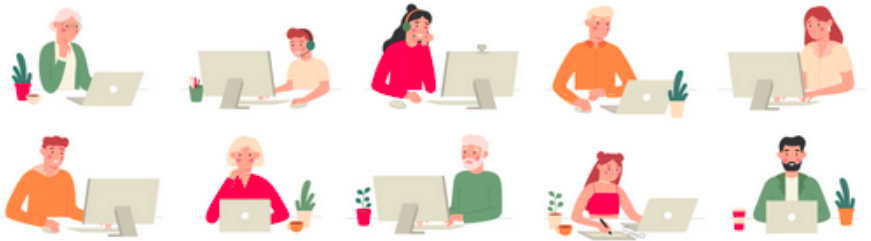

.... with coffee and mate consumption increasing daily.

Objectives of POEMS

O1 – Deepen our knowledge of stellar winds and wind inhomogeneities, derive comprehensive mass-loss rates for different, non-eruptive phases in massive star evolution, and unravel the potential of slow-wind solutions in forming circumstellar disks.

O2 – Gain insight into the pulsation habits of various types of evolved massive stars. Quantify the contribution of pulsation-triggered mass loss to the total mass-loss rate, and explore the potential of specific pulsation modes to cause mass eruptions.

O3 – Achieve comprehension of the chemistry and the physical structure of the material ejected from evolved massive stars.

O4 – Explore the interaction of stellar winds and ejecta of massive stars with their local ISM and the creation of bow shocks and astrospheres.

O5 – Unveil the role of binarity for the occurrence of massive stars in extreme phases.

O6 – Improve our comprehension of stellar evolution of massive stars and unveil evolutionary links between the individual phases of extreme massive stars.

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We need more collaborators!

Consortium composition

Germany
University of Goettingen

- Stellar pulsations (theory)
- HD modeling
- Numerical simulations
- WR, LBV, YHG, and BSG stars

Czech Republic
Astronomical Institute

- Stellar atmospheres, clumping
- Stellar pulsations (obs)
- (M)HD, astrospheres, winds
- Molecules and dust (theory)
- B[e], YHG, BSG and WR stars
- Optical spectroscopy

Estonia
Tartu University

- Stellar ejecta and light echos
- Stellar pulsations (obs)
- YHG, BSG, Novae stars
- massive binaries
- Optical spectroscopy, imaging, radio observations

Argentina
Universidad Nacional de La Plata

- Stellar atmospheres and winds
- Molecules and dust (obs)
- Stellar pulsations (theory)
- Stellar evolution
- Be, B[e] and BSG stars
- Infrared and radio observations

United Kingdom
University of Leeds

- Circumstellar disks (obs)
- YHG, RSG, B[e], and pre-MS stars
- Spectroastrometry
- Optical interferometry
- Spectropolarimetry

Belgium
Royal Observatory

- Stellar atmospheres and winds
- HD modeling
- Fundamental atomic parameters
- YHG, LBV stars, massive binaries
- Stellar pulsations (obs)
- Imaging and spectroscopy

Brazil
Observatorio Nacional

- Circumstellar material (obs)
- Molecules and dust (theory)
- Be, B[e] and LBV stars
- Massive binaries
- Speckle and optical interferometry
- Spectroscopy and polarimetry

Chile
Universidad de Valparaiso

- Stellar rotation and winds
- HD modeling
- Stellar pulsation (obs)
- Outflowing disk winds
- Be stars, OBA supergiants
- High-cadence spectroscopy

Chile
Pontificia Universidad Catolica de Valparaiso

- Astrostatistics
- Wavelet analysis
- Time-series analysis
- Markov chains Monte Carlo

Chile
Universidad Mayor

- Stellar winds
- Hydrodynamics
- Radiative transfer
- Numerical modeling

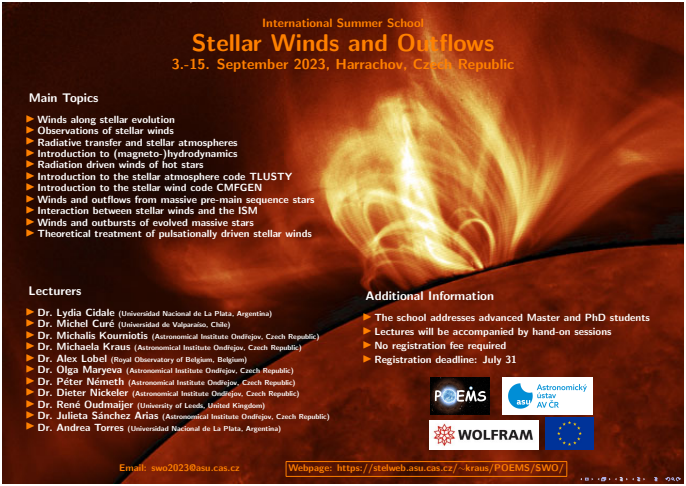
Azerbaijan
Shamakhy Astrophysical Observatory

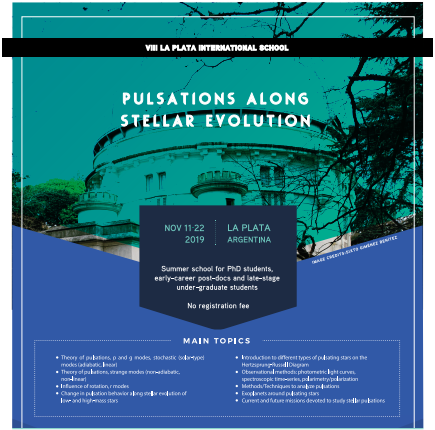
- Massive binaries
- O supergiants
- LBVs, and WR stars
- Optical spectroscopy

Marie Skłodowska-Curie Staff Exchange

- Focus is on training and knowledge transfer.
- Achieved through secondments of up to 12 months per researcher between involved European and non-European institutes.
- Ideal for PhD-students and post-docs to acquire new knowledge and for improving their skills.
- Additional research money for organizing activities.

Activities: 2 Summer Schools





Activities: 2 Summer Schools

- Dedicated lectures with exercises and hands-on sessions as well as individual project works.
- Highly motivated and active participation from the students.

Activities: Final conference

To share the results (and any newly arising open questions) with the astronomical community and to motive the young generation to continue performing research in physics of extreme massive stars.

I warmly welcome you all
and wish you a splendid
and fruitful conference!