Closing Remarks: Part I

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Massive Stars

Golden age:

stars are sort-of back “in style”

binaries are “main stream”

mergers are accepted as a phenomenon

observations infrastructure is superb and getting even better

computational capabilities never sufficient but excellent

Monday

Session 1: Observations and surveys of massive stars, Chairs: G. Bosch and R. Barba

The massive star content of the Magellanic Clouds --P. Massey

Infrared properties and mid-infrared variability of red supergiant stars in the Large Magellanic Cloud--M. Yang

Surveys and populations of Wolf-Rayet stars--K. Neugent

Unlocking the galactic Wolf-Rayet population with Gaia DR2--G. Rate

A MUSE wide-field adaptive optics view of the massive star population in the SMC cluster NGC 330--J.Bodensteiner

Binary star interactions: periastron events and evolution--G. Koenigsberger

Extreme AO of massive stars: searching for faint companions using VLT/SPHERE for the CHIPS project--A.Rainot

Determination of absolute masses through apsidal motion studies -G.Ferrero

FLAMing MiMeS: Can we extend our investigations of massive-star magnetism to nearby galaxies?--G. Wade

NGC 1624-2: anomaly or archetype?--A. David-Uraz

Spectroscopic monitoring of Galactic O and WN stars: some highlights of the OWN Survey--R. Gamen

The Tarantula massive binary monitoring: quantitative spectroscopy of O-type binary systems in 30 Dor--L.Mahy

Closing the divide - super-AGB stars vs. red supergiants--C. Doherty

Properties of massive stars in Galactic binary systems--C. Sab Sanjuli

Spectral-photometric analysis of the binary system HM1 8--C. Rodriguez

Tuesday

Session 2: Stellar evolution, Chairs: P. Massey and L. Cidale

- Challenges in the understanding of the evolution of massive stars--A. Granada
- The origin of Wolf-Rayet stars at low metallicity--T. Shenar
- Three dimensional radiation hydrodynamic simulations of massive star envelopes--M. Cantiello
- Pulsations as a common mass-loss trigger in evolved massive stars?--M. Kraus
- Testing the evolution theory with accurate parameters for two early-type eclipsing binary systems in the LMC-- Taormina
- Binary evolution of massive stars and presupernovae --O. Benvenuto
- Missing links in the evolution of massive binaries--R. Barba
- Angular momentum evolution in massive binaries--A. Gilkis
- Spectropolarimetry of WR + O binaries with SALT--A. Fullard

Session 3: Massive stars and their environments, Chairs L. Cidale and E. Levesque

- Massive stars and their environments--C. Leitherer
- Over 100 massive stars in the Milky Way's central parsec: hydrodynamics, X-ray synthesis, and 360-degree videos--C. Russell
- Super star cluster evolution: where is 30 Doradus going?--E. Terlevich
- Diagnosing massive star content from nebular emission of HII regions--A. Beer
- Eta Carinae: a stable star behind a dynamic circumstellar environment--A. Damineli
- Revealing colliding wind binaries with radio interferometry: WR 11 and WR 133--P. Benaglia
- Non-thermal emission from stellar bow shocks--S. del Palacio

Wednesday

Session 4: Final fate of massive stars and their outcome, Chairs E. Pian, J. Anderson and M. Bersten

- Stripped-envelope supernova progenitors--G. Folatelli
- Fast and faint supernovae from binary progenitors--E. Laplace
- Systematic study of ejecta-companion interaction--R. Hirai
- Light echoes of Eta Carinae, LBV eruptions, and pre-supernova mass loss--N. Smith
- Red supergiants: new perspectives on dying stars--E. Levesque
- The red supergiant progenitors of type II-plateau supernovae--S. Van Dyk
- Analysis of a select group of type II-P supernovae--L. Martinez
- Progenitor mass distribution of core-collapse supernova remnants in our Galaxy and Magellanic Clouds based on elemental abundances--S. Katsuda
- Insights into core-collapse supernovae from spectral modeling--J. Hillier
- Mass loss before core-collapse supernovae--A. Howell
- Progenitor mass loss and supernova remnant evolution--D. Patnaude
- The 30-year search for the compact object in SN 1987A--D. Alp
- A new method to measure the distance to historic transients--C. Contreras

Presentations will be on-line

Challenges

"observers largely underestimate the actual uncertainties still present in stellar modeling, especially in binary evolution”

O. Benvenuti

Convection

Mass Loss: eruptions

Internal mixing

Magnetic Fields

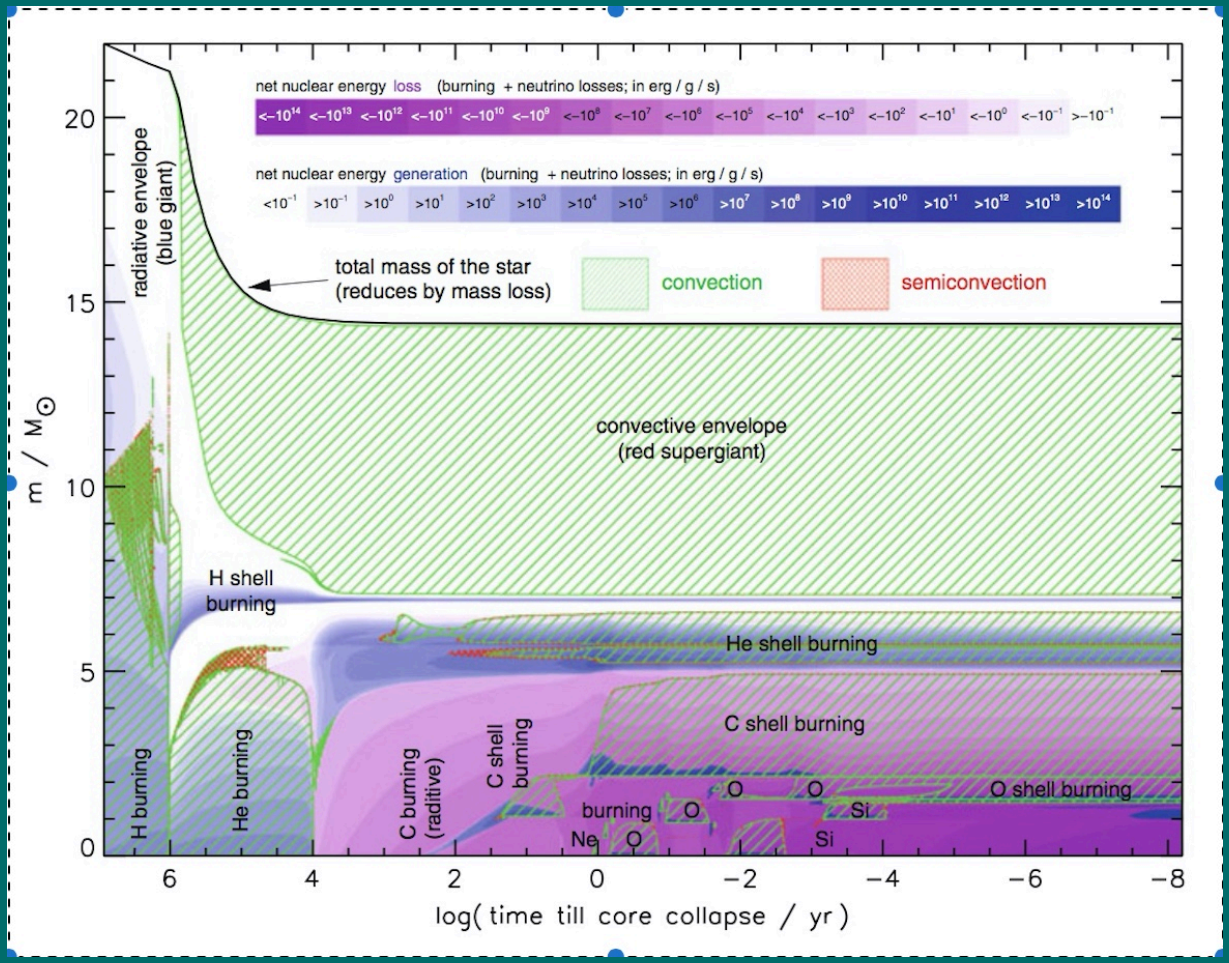
Multiplicity

Phenomena are 2D or 3D

Currently: “Models can explain everything but not with the same model”

I. Arcavi

Massive star – SN connection



J.W. Truran Jr., A. Heger, Origin of the elements, in *Meteorites, Comets and Planets: Treatise on Geochemistry*, 2005

Massive star – SN connection

These evolved stages act as a "sort of magnifying glass, revealing relentlessly the faults of calculations of earlier phases" (Kippenhahn & Weigert 1991).

Thanks to Phil Massey for getting me the quote!

Challenges

Observational diagnostics do not always refer to the same region described by the models

- Winds, “Fluff” can be extended and optically thick
- Atmosphere models : T_{eff}, $R_{2/3}$ + extrapolation
- Interior models sometimes provide T, R at hydrostatic radius

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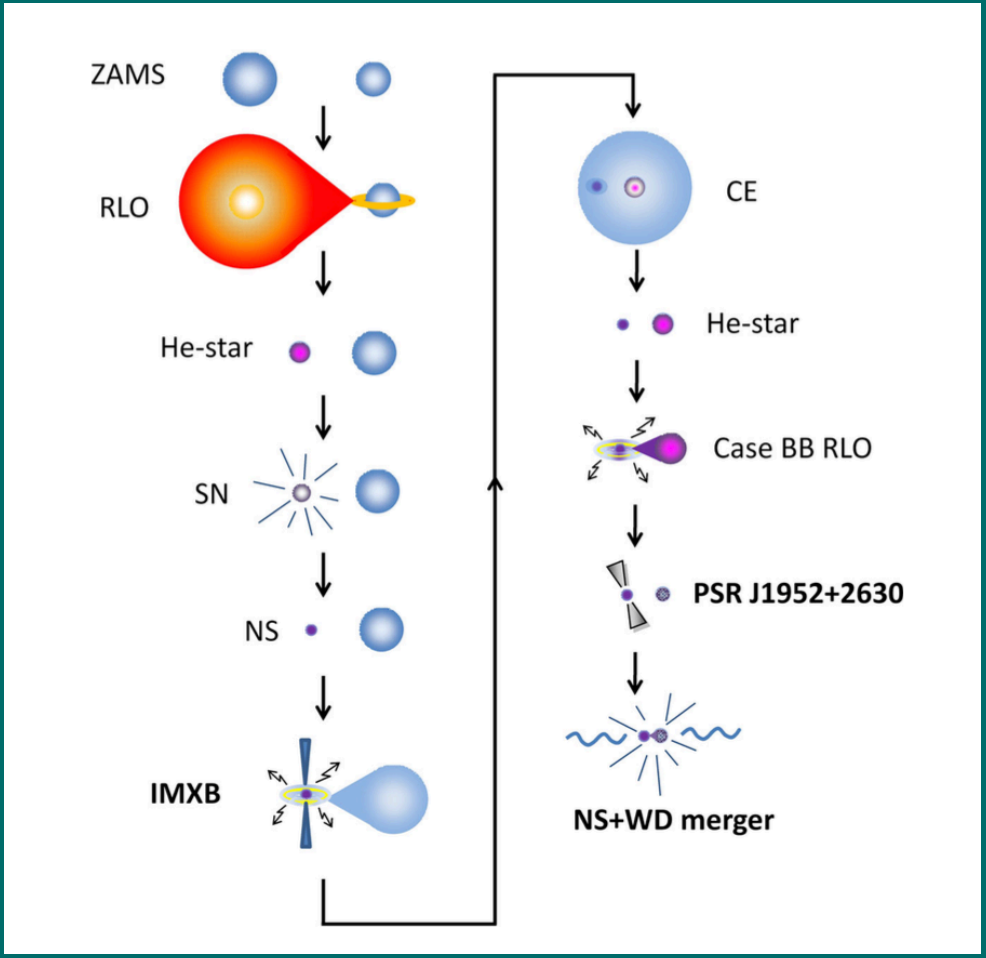
extrapolation depends on wind structure

- radiation pressure
- pulsations
- magnetic fields

Binaries


ZAMS
RLO
He-star
SN
NS
IMXB
CE
He-star
Case BB RLO
PSR J1952+2630
NS+WD merger

Binaries

“The daunting complexity of binary evolution has caused some people to decide that this problem is simply a cleverly disguised opportunity for theorists (and enterprising observers) to ascend into free-parameter heaven.

This view, whatever its merits, ignores the fact that many massive stars are members of binaries where interactions must occur during the normal course of evolution.”

Jay Gallagher, 1989, Physics of Luminous Blue Variables

A lot still to do ....

In this conference ~130 participants

>35 collaborators

~11 massive

~24 SN

~ 5 work in both fields

Amazing synergy

Thank you for bringing us together in this meeting

Thank you for being such a great collaborator and friend

Thank you for keeping history alive for the new generations

2017-04-24

Final quote

"Then she took the right path in life and started working on SN”

M. Hamuy

To which I must make a correction .....

Massive Stars

"Then she ~~took the right path in life~~ and started working on SN”

M. Hamuy

Then she branched out and started working on SN

GK

On which note, here is Roberto for the second part of the summary