**Main properties**

**Blue giant:**

* Post main sequence
* Burns Helium due to exhausting all of its hydrogen
* Spectral type O, B and A
  + Type A are blue stars, average surface temperature of 7500-11,000K, average mass of 3.2 solar mass, average radius of 2.5 solar radius, average luminosity of solar luminosity (e.g. Sirius, Vega)
  + Type B are Blue stars, average surface temperature of 10,000-25,000K, average mass of 18 solar mass, average radius of 7 solar radius, average luminosity of 20,000 solar luminosity (e.g. Rigel, Spica)
  + Type O are blue stars, average surface temperature over 25,000K, average mass of 60 solar mass, average radius 15 solar radius, average luminosity of 1,400,000 solar luminosity (e.g 10 Lacertra, Naos)
* Blue supergiants inhibit O and B type only

Super giants:

* Largest known type of star
* Very rare
* Evolve into neutron stars or black holes after a supernova
* General luminosity class 1
* General spectral class O and B
* Slower burning phase in the death of a massive star
* Smaller photosphere and slower core nuclear reactions result in similar energy coming from a smaller area, the surface becomes much hotter

From: <https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full>

- “Important metal factories”

- “Short and energetic lives”

- “The formation, evolution and explosive deaths of massive stars impact the surrounding interstellar medium and shape the evolution of their host galaxies”

- “Chemical yield of the ultimate supernova and the remnant mass of the compact object, strongly depend on the interior physics of the progenitor star”

- “the study of stellar structure and evolution using stellar oscillations – astroseismology – has undergone a revolution in the past two decades”

- “Massive stars were amongst the first stars in our Universe ([Bromm and Larson, 2004](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B57); [Bromm et al., 2009](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B58)), and are progenitors of core-collapse supernovae and gamma-ray bursts ([Heger et al., 2003](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B124); [Smartt, 2009](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B253); [Tanvir et al., 2009](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B265); [Modjaz et al., 2019](https://www.frontiersin.org/articles/10.3389/fspas.2020.578584/full#B176)).”

- “Massive stars typically form in dense, cold and large molecular clouds”

- “One of the important signatures of massive star formation being giant filament structures and powerful bi-polar outflows when they are embedded in such dense clouds”

- “The length of the main sequence phase is governed by the nuclear time scale, with more massive stars having shorter main sequence life times”

- “Massive stars produce intense radiation fields from their high luminosity and experience line-driven winds”  
“- “play major roles in the shaping of their environment”

From: <https://www.aanda.org/articles/aa/pdf/2014/05/aa20602-12.pdf>

- “The (N/C) and (N/O) ratios are the most sensitive quantities to mixing in stellar interiors of intermediate and massive stars.”

- “ a growing body of evidence has been assembled indicating that rotation , binarity and possibly magnetic fields are as important factors for massive star evolution as mass-loss.”

From: <http://articles.adsabs.harvard.edu/pdf/2009CoAst.158..113P>

- “Most of our knowledge about the physical parameters of hot stars (O, B and A type stars originates form quantitive spectroscopy i.e the analysis of stellar spectra by means of atmospheric models”

- Intense radiation field, low densities in their line and continuum forming regions”

- “radiative rates depends on the radiation field, whereas the radiation field depends on the opacities and emissivities, which themselves are functions of the occupation numbers,”

- “Due to their high luminosity, all massive stars display stellar winds, mostly driven by radiative line acceleration, since there are numerous spectral lines with high interaction probability close to the stellar flux maximum”

- “The mass loss is metallicity dependent”

- “Typical mass loss rates range from 10-7 stellar mass yr-1 up to 10-5 stellar mass yr-1”

- “Terminal velocities scale with the photospheric escape velocity, from 200 km s-1 (A-supergiants) to more than 2000 km s-1 (O type stars)”

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