



Münchner Physik- Kolloquium

at home!
Winter
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Turbulent lives of stars

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Monday, 10 January 2022, 17:15 h

<https://tum-conf.zoom.us/j/93234766313> Meeting-ID: 932 3476 6313 Password: Kolloquium
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Stars are the basic building blocks of the visible Universe. Understanding how they transformed the pristine Universe into the one we live in today is at the heart of astrophysical research and vital for many areas in astrophysics. For example, massive stars are cosmic powerhouses and their immense radiation, strong stellar winds and powerful supernova explosions helped to re-ionise the Universe after the Dark Ages, drive the evolution of galaxies and laid the foundation for life as we know it. At the end of their lives, stars produce compact objects whose mergers are now routinely observed thanks to gravitational-wave observatories. Yet, our understanding of the lives and final fates of stars is seriously incomplete. I will review some pressing challenges in stellar astrophysics with a particular emphasis on massive binary stars. In binary systems, stars can exchange mass, thereby completely changing their evolution and final fates. Stripping off the envelope of a massive star may allow it to explode in a supernova and produce a neutron star instead of collapsing into a black hole. In many cases, binary mass transfer results in stellar mergers and common-envelope episodes. I will present simulations that show the emergence of strong magnetic fields in such dynamic and turbulent phases with possibly far-reaching consequences. Merged stars may be highly magnetic and the progenitors of the strongest magnets in the Universe, so-called magnetars. In common-envelope episodes, the magnetic fields can drive bipolar, jet-like outflows and may help explain the shapes of asymmetric planetary nebulae.