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INVITED SPEAKER: Modelling the progenitors and environments of stellar explosions

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Abstract content
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Smoothed Particle Hydrodynamics (SPH) is a Lagrangian technique particularly suited to simulating hydrodynamical flows with arbitrary geometries. We briefly highlight the physics behind the method and its application to a wide range of problems in astrophysics. We then focus on 3D SPH models of the progenitors and environments of stellar explosions, with RS Ophiuchi, a symbiotic nova system consisting of a red giant and an accreting white dwarf which undergoes thermonuclear outbursts every 10-20 years, as the primary example. Our results show that the circumstellar outflow is highly asymmetric with evidence for a dense, equatorial component and bipolar ejecta morphology. The white dwarf is thought to be close to the Chandrasekhar mass making the system a likely Type Ia supernova progenitor. We discuss the origin and formation of the circumstellar structures in detail, and the observable spectroscopic and photometric signatures we expect from their collision with the explosive supernova ejecta.

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