

# RECENT PROGRESS ON THE MODELLING OF CRYSTALLIZING WHITE DWARFS

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The exquisite *Gaia* astrometry has recently opened up the possibility of testing our understanding of white dwarf evolution in unprecedented details. In particular, the signature of core crystallization in the *Gaia* HR diagram informs us on the magnitude of the cooling delay induced by the release of latent heat and by chemical fractionation processes taking place during this phase transition. Remarkably large discrepancies with theoretical models have been identified, stimulating a flurry of modelling efforts over the past few years. In this talk, I will discuss the two main sources of uncertainty for the modelling of core crystallization: (1) the microphysics of chemical fractionation and (2) the initial core composition profile at the beginning of the white dwarf cooling track. I will first present our recent work on dense plasmas phase diagrams and how the “distillation” of  $^{22}\text{Ne}$  can explain the recent observational puzzles. I will then discuss our ongoing efforts to determine the efficiency of convective boundary mixing in red giant stars using large-scale high-resolution 3D hydrodynamics simulations with the goal of better constraining the core composition of white dwarfs.