Can Oort clouds pollute their parent stars after they become white dwarfs?

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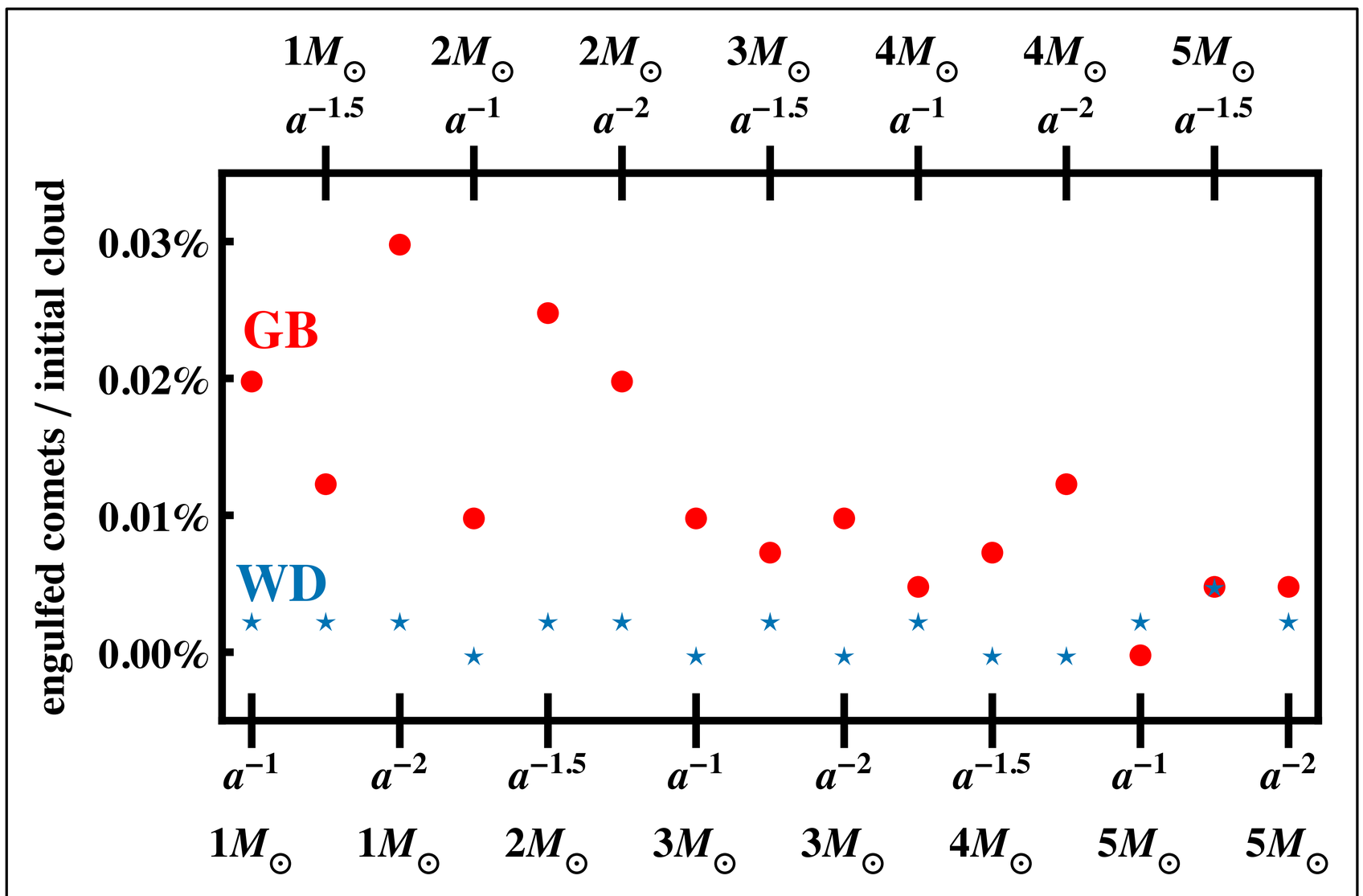
Veras et al. (MNRAS, 2014, 445, 4175)

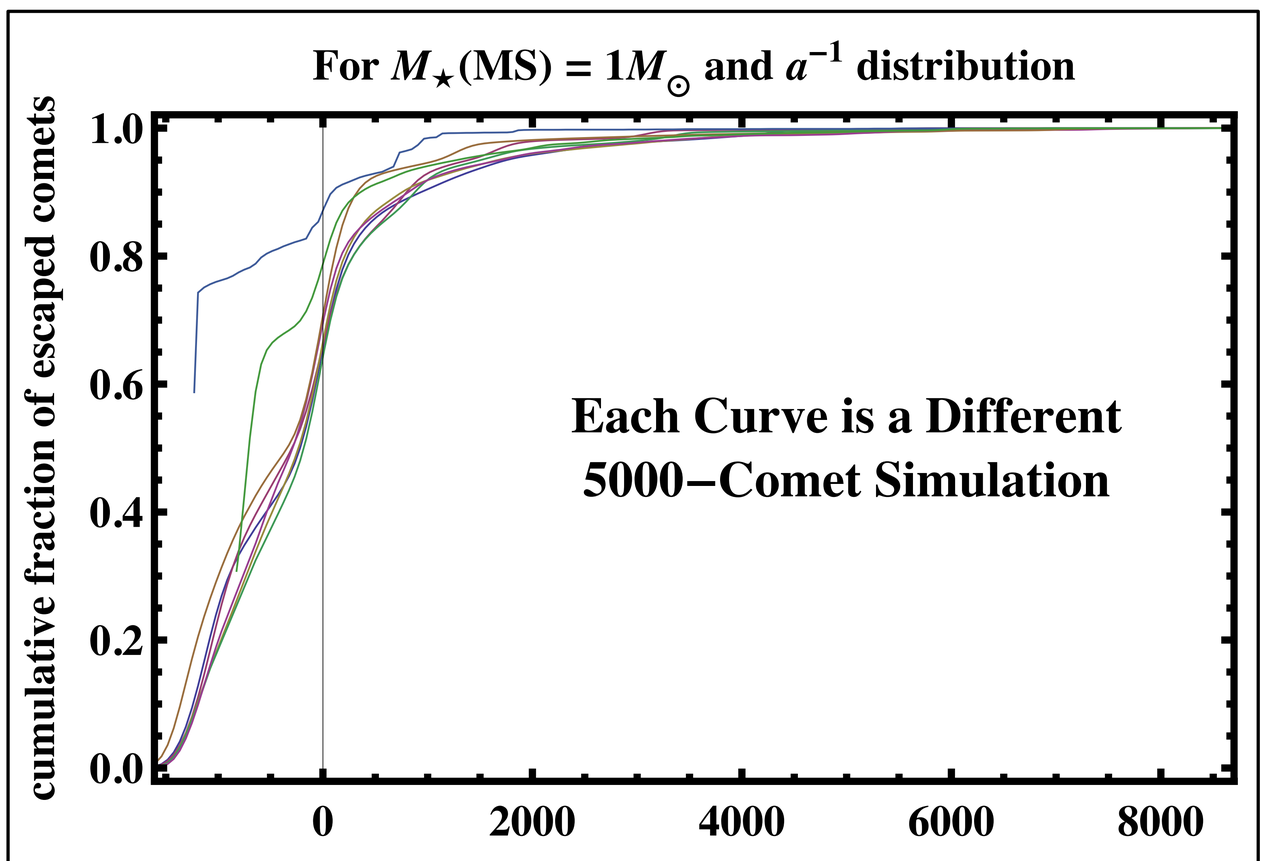
The dynamical origin of the rocky and snowy planetary debris in white dwarf atmospheres is uncertain.

Here we quantify the contribution from exo-Oort clouds through simulations.

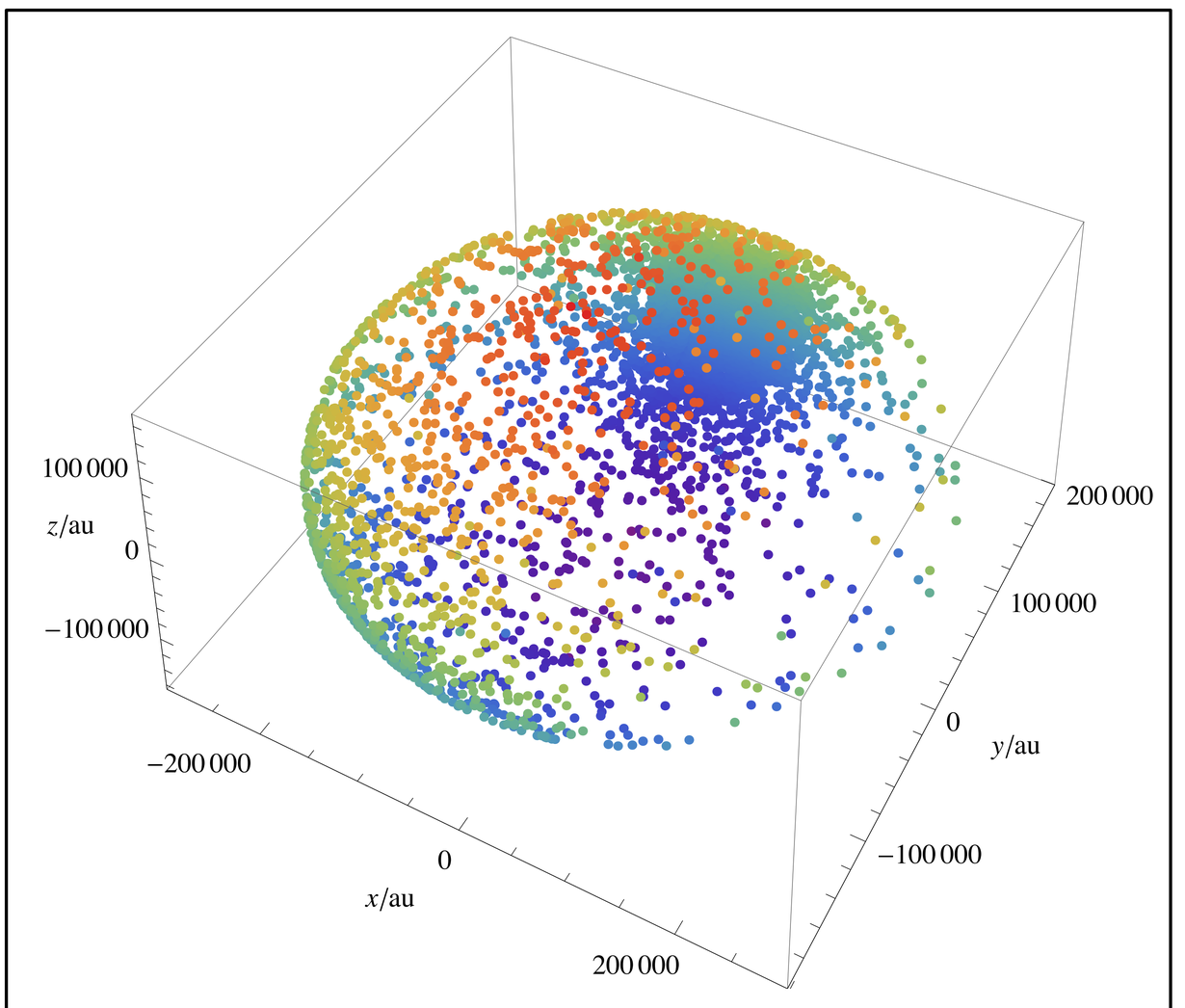
We find that these clouds can represent only secondary contributors to pollution; the primary contributors are instead likely exo-Kuiper belts or exo-asteroid belts.



The fraction of comets in exo-Oort clouds which enter the Roche radius of the star when it is a giant branch star (GB; red filled dots) or a white dwarf (WD; blue stars). The results are binned according to the main-sequence stellar mass (and the mass-losing phase). Hence, comets are expect to hit the white dwarf at a rate of about one per 10,000 yr.



Cloud dissipation: the cumulative distributions of escaped exo-Oort cloud comets as a function of time.



Patchy escape due to an intrusive stellar flyby: the Cartesian (x,y,z) locations where comets escape the Hill ellipsoid for a single 5000-comet 10 Gyr simulation with a stellar progenitor mass of 1 Solar mass.