Deposition of steeply infalling debris — pebbles, boulders, snowballs, asteroids, comets — around stars

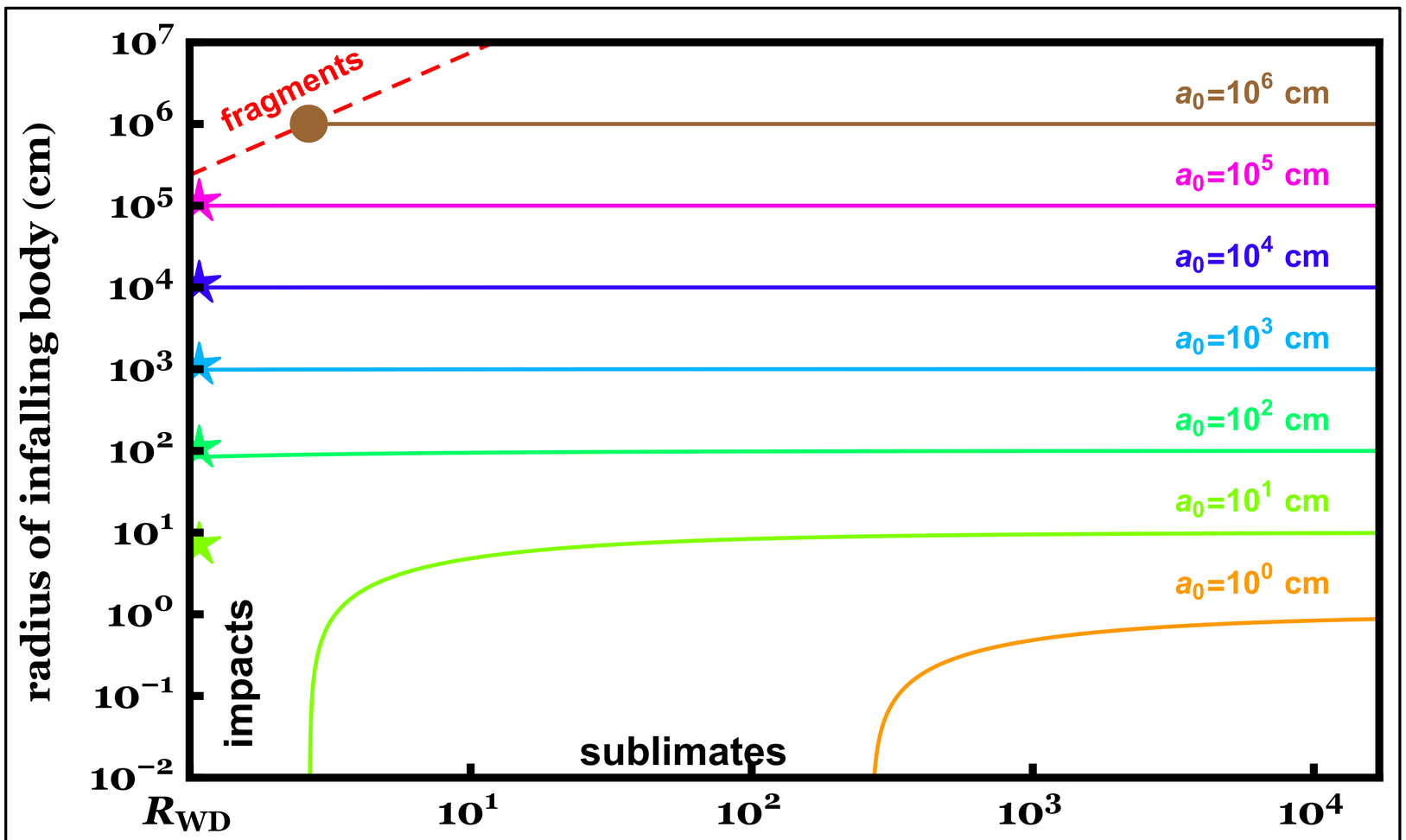
John C. Brown[1], **Dimitri Veras[2],** Boris T. Gänsicke[2]

[1]University of Glasgow, [2]University of Warwick

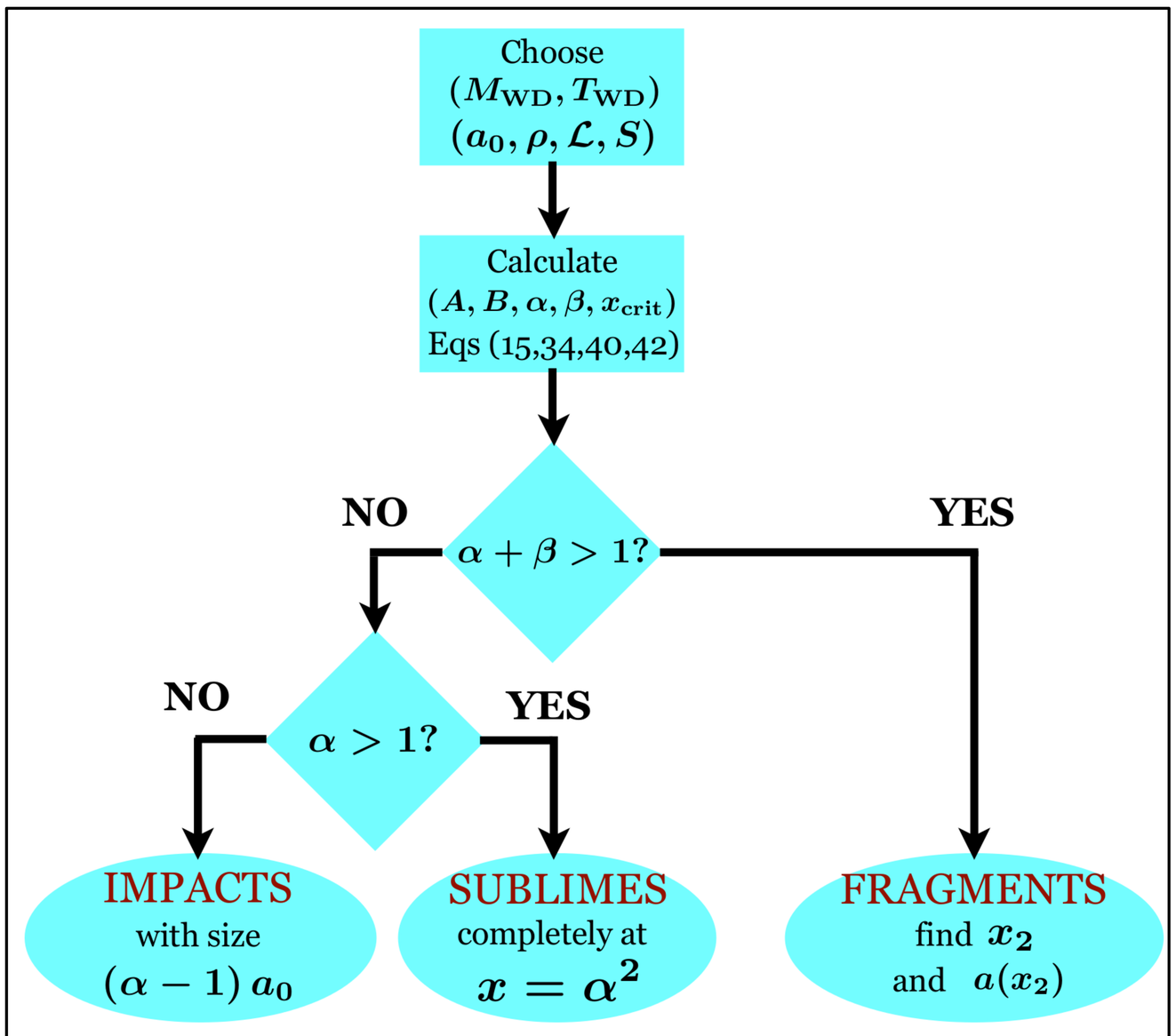
Brown et al. (MNRAS, 2017, 468, 1575)

We determine the fate of small rocky and snowy bodies that are steeply infalling into their parent stars.

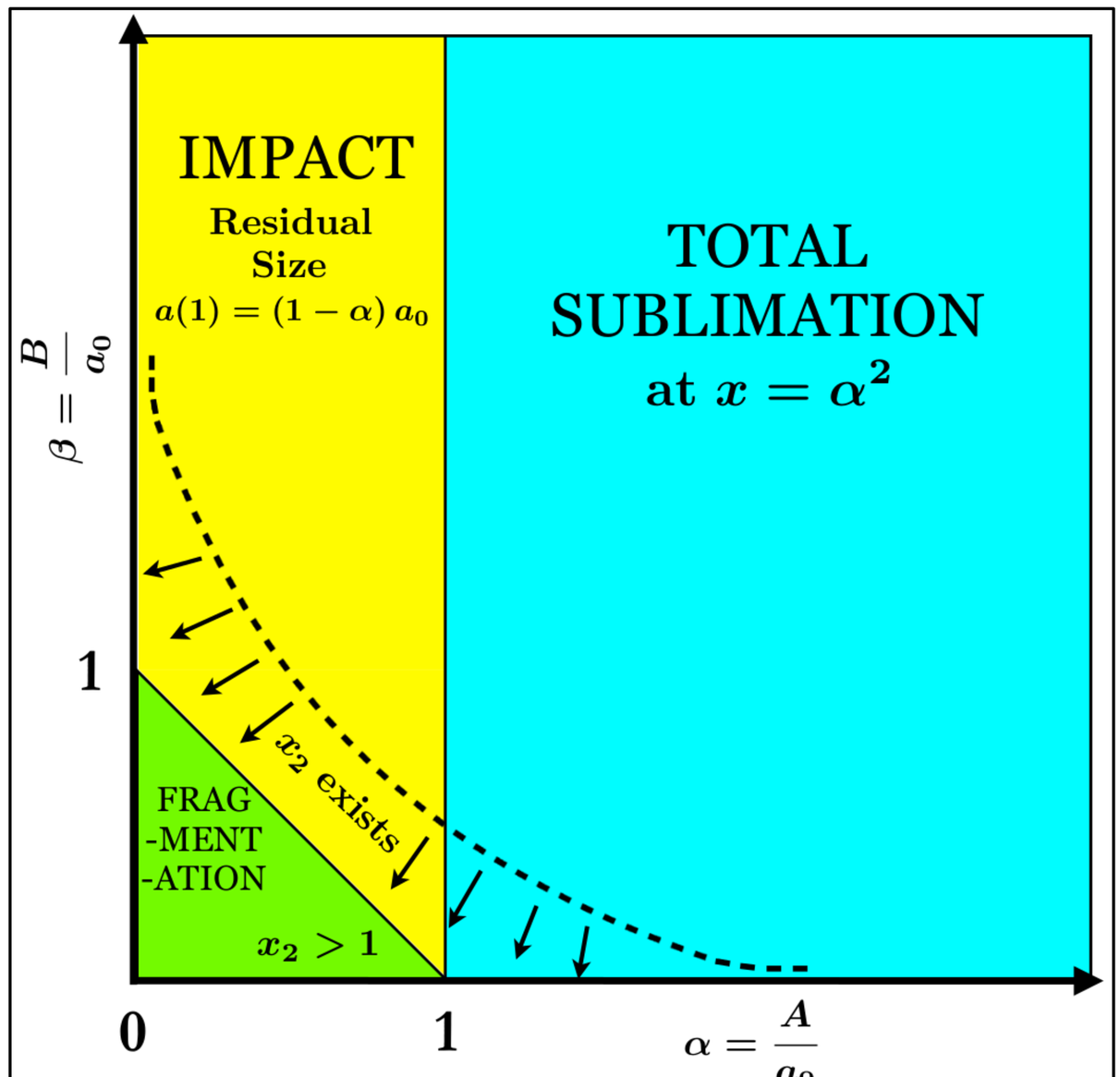
The resulting regimes of fragmentation, sublimation and impact are obtained analytically with explicit formulae and no differential equations.



Size evolution of rocky bodies (read from right to left) falling into a star with a mass of 0.6 solar masses and a temperature of 15,000 K (such as a white dwarf). The three outcomes are sublimation (bottom axis, in units of white dwarf radius), fragmentation (dashed red line), or impact (left axis).



Schematic flow chart of how to determine the mode and position of destruction of any infaller for any star starting from the adopted physical parameters.



The three distinct domains of infaller destruction in phase space.

These relations help us to deduce the origin of the planetary debris that we see in white dwarf atmospheres.