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A new channel to form near- and sub-solar-mass black holes and naked singularities

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Existence of naked singularities is a topical and fundamental issue of physics. The formation mechanism of such objects, particularly those with near-solar-mass, is not yet clear. Since, recent gravitational wave events have suggested the existence of near-solar-mass collapsed objects which cannot be formed via stellar evolution, here we investigate a likely formation channel, and especially if a near-solar-mass cosmic object can be transmuted into a Kerr naked singularity by capturing primordial dark matter particles. If the dynamical ejecta is small during the transmutation, the said cosmic object could be transmuted to a Kerr naked singularity. On the other hand, if the dynamical ejecta is large, the same will be transmuted to a sub-solar mass Kerr BH. We show that many white dwarfs could transmute into Kerr naked singularities or a sub-solar mass Kerr BHs (depending on the amount of dynamical ejecta), while neutron stars may not, and mention plausible observational implications (<https://arxiv.org/abs/2401.08462>).

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