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Formation, Mass Distribution, Energy Deposition, and Radiofrequency Detection of Magnetized Quark-nugget Candidate for Dark Matter J PACE VANDEVENDER, VanDevender Enterprises, IAN D. SHOEMAKER, Virginia Tech, T. SLOAN, Lancaster University, AARON P. VANDEVENDER, Founders Fund — Magnetized quark nuggets (MQNs) are theoretical objects composed of approximately equal numbers of up, down, and strange quarks. Tatsumi calculates they form a ferromagnetic fluid bound by strong nuclear forces and have a surface magnetic field B_o between 10^{11} and 10^{13} T in magnetars. We apply that result to a quark-nugget dark-matter candidate consistent with the Standard Model. We report the results of analytic calculations and Direct Monte Carlo Simulations that show: 1) aggregation by self-magnetic forces outruns decay by weak interaction and produces a broad mass distribution with maximum baryon number $A >> 10^{27}$ in 1 ms, after which they meet the requirements for dark matter, 2) MQNs interact with dense matter through a magnetopause and deposit kJ/m to many MJ/m that enables some modes of detection, and 3) they spin-up and emit electromagnetic radiation at MHz frequencies after passage through matter, which enables additional modes for detection. The results depend strongly on the value of B_o; which we treat as a parameter to guide and interpret observations.

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