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Collapsing Bose stars as source of repeating fast radio bursts

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The substructures of light bosonic (axion-like) dark matter may condense into compact Bose stars. Peculiar self-interaction potential of the ALPs introduces attraction between particles and causes collapse of large-mass Bose stars. These processes proceed in an unexpected universal way. First, the central part of Bose star approaches a singular density profile due to self-similar infall of the ALP into the star center. Second, multiparticle relativistic interactions in the dense center stop the collapse and produce an outgoing stream of mildly relativistic ALP. This two-step process is repeated many times separated by random time intervals required to construct the next self-similar collapsing solution. We find that powerful flashes of radio waves may be produced during the collapse due to parametric resonance of photons caused by oscillating axion field of the Bose star. We show that spectrum, energy, duration, repeatability of the flashes produced during Bose star collapse coincide with the properties of repeating fast radio burst FRB 121102.

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