Astrophysics Seminars

Tuesday

May 1

12:30 P.M.

Rm 184 NSH

Can we send relativistic-speed nanocrafts to nearby exoplanets? Challenges and Solutions

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The Breakthrough Starshot initiative aims to launch gram-scale spacecraft to relativistic speeds of v ~ 0.2 c, capable of reaching the closest Earth-like exoplanet, Proxima b, in 20 years. One of the most critical challenges facing this ambitious project originates from the interactions of relativistic nanocrafts with the interstellar medium during its journey to Proxima b. In this talk, I will first present our quantitative evaluation of the damage to a relativistic nanocraft by interstellar gas and dust. Second, I will discuss the deflection and oscillation of a charged nanocraft due to the interstellar magnetic field. Third, I will discuss the gas drag force at high energy regime and quantify its effect on the deceleration of a relativistic lightsail. Finally, we will discuss practical strategies to mitigate the impacts of the interstellar medium, and to control the nanocraft attitude in order for the spacecraft to reach an intended exoplanet.

PHYSICS