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**Improving Habitability of Earth-sized Proxima Centauri b by its Exomoon** SERGIO GARZA, MARIALIS ROSARIO-FRANCO, NIUSHA DAVICHI, ZDZISLAW MUSIELAK, Univ of Texas, Arlington — In an unprecedented discovery, an Earth-sized exoplanet was confirmed on a stable, low-eccentricity orbit within the habitable zone of our nearest neighbor, Proxima Centauri. While the exoplanet, Proxima Centauri b (PCb), is located within the region that may support liquid water on its surface, its habitability has been questioned due to dangerous flares generated by its M dwarf host star, as well as possible tidal locking. This work aims to understand the constraints under which an exomoon can maintain stable orbits around PCb, and improve the habitability of the exoplanet by its presence. We utilize the N-body integrator REBOUND, to explore in-situ and post-massive impact scenarios of exomoon formation, and perform orbital evolution studies of these satellites. In these studies, an initial disk mass is distributed across the systems Roche and Hill radii as massive proto-satellites and smaller moonlets. We present the results of numerical simulations of exomoons of varying masses, determine locations of their stable orbits around Proxima Centauri b, and discuss the possible effects caused by their presence on the exoplanets habitability.

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