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IR-excesses around nearby Lambda Boo stars are caused by debris disks rather than ISM bow waves

Lambda Boo stars are predominately A stars with solar abundant C, N, O, and S, but up to 2 dex underabundances of refractory elements (Fe, Mg, Si, etc.). The stars' unusual surface abundances could be due to a selective accretion of circumstellar or interstellar material. It has been proposed that there is a correlation between the Lambda Boo phenomenon and an IR-excess, which is hypothesized to be caused by a debris disk or an interaction with the interstellar medium (ISM). Either of these mechanisms, both of which cause an IR-excess, could be the source of the accretion material. We observe 70 or 100 and 160 μm excess emission around 9 confirmed Lambda Boo stars with the Herschel Space Observatory, to differentiate whether the origin of the emission is a debris disk or a bow wave of ISM dust repelled by the star. We find that 3/9 stars observed host well resolved debris disks. While the remaining 6/9 are not resolved, their excess emission is inconsistent with an ISM bow wave based on the emission being more compact for its temperature given ISM sized dust. Furthermore, ISM bow wave models would produce a hotter emission than what generally observed. We also find that the incidence of bright IR-excesses around Lambda Boo stars is higher than that of normal A-stars. To provide a causal explanation for why the Lambda Boo phenomenon is correlated with debris disks, we explore Poynting-Robertson (PR) drag as a mechanism for secondary accretion onto the star. We find that the accretion rates are too low to cause the surface abundance anomaly observed. As an alternative, we propose the higher incidence rate of debris disks around Lambda Boo stars may not be caused by dust from a steady-state collisional cascade, but instead correlated with higher dynamical activity in the disk currently underway. Large impacts of planetesimals or a higher influx of comets could then provide the necessary levels of volatile gas for accretion. Further study of the transport of debris disk material and the nature of the stellar abundance anomalies are required to rule out or explain the Lambda Boo phenomenon through external accretion.