

What is hot dust doing so close to main-sequence stars?

Excess near-infrared emission is detected around one fifth of main-sequence stars, but its nature is a mystery. These excesses are interpreted as populations of small, hot dust very close to their stars, but such grains should rapidly sublimate or blow out of the system. Many models have been put forward to explain this phenomenon, but to date, none has successfully explained the nature of hot dust, nor its ubiquity around such a diverse range of star types and ages. The fundamental problem is that it is unclear how to deliver and sustain these dust populations, which comprise grains small enough and hot enough for their near-infrared emission to significantly exceed their mid-infrared emission. I summarise the current status of the field, including what we do and do not know from observations and recent theoretical work. I give an overview of the diverse range of models seeking to explain hot dust, and particularly focus on how upcoming observations with VLT/MATISSE should significantly improve our understanding. I also discuss areas where further progress must be made if we are to explain the phenomenon. My aim is to motivate input from the broader dust community, to identify any physics that we may have overlooked, and identify promising new directions in our attempts to explain hot dust.