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TITLE: Water in Massive Young Stellar Objects Revealed by Herschel PACS Spectroscopy

ABSTRACT BODY:

Abstract Body: Water has been found in various stages of star formation and plays a role as an efficient coolant. We have detected multiple water lines in the Herschel PACS imaging spectroscopy data toward ten massive young stellar objects taken as part of the WISH project. The ten targets include four high mass protostellar objects, two hot molecular cores, and four ultracompact HII regions. The water lines detected in our sample appear either in emission or in absorption depending on relative positions from the object center and wavelengths: absorption tends to appear in shorter wavelengths and/or toward central positions. We discuss the origin of water lines based on line flux spatial distributions, rotational temperature distributions, and line flux ratios, as well as compared to central heating envelope models. In addition, OH line results are addressed for whether they can be understood in the same manner of water.

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