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Title **Comet 29P/Schwassmann-Wachmann Observed with the Herschel Space Observatory: Detection of Water Vapour and Dust Far-IR Thermal Emission**

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Abstract The distant comet 29P/Schwassmann-Wachmann was observed with the HIFI, PACS and SPIRE instruments aboard the Herschel Space Observatory, as part of the guaranteed time key programme "Water and related chemistry in the Solar System" (KP-GT HssO). Supporting observations of the 230 GHz CO line were carried out with the IRAM 30-m telescope. The HIFI observations of the 557 GHz H₂O line were performed on 19.05 April 2010, about 2 days after a major outburst, and on 11.02 May 2010, when 29P was in a more quiescent phase. H₂O was detected on both dates with a production rate corresponding to about 1/10th the CO production, assuming near-nucleus production. The H₂O line shape is consistent with release of water vapour from icy grains. PACS and SPIRE imaging data from 70 to 500 micrometers were acquired mid-June 2010 when the comet was in a quiescent phase. The continuum emission detected in the 70- μ m and 160- μ m PACS images is weakly extended with respect to the PSF, suggesting a major contribution from the nucleus or from slowly moving large grains.

