

**High-resolution, near-
infrared observations of
Rosetta target
67P/Churyumov-
Gerasimenko with NASA
IRTF/iSHELL: Placing
ground based and space-
based measurements in
context**

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The Rosetta mission, which orbited comet 67P/Churyumov-Gerasimenko from 2014-2016, provided the most detailed study of a comet to date. However, the mission also left us with several unresolved questions. 67P had a favorable apparition for ground-based studies in 2021 during which we acquired several nights of high-resolution, near-infrared spectroscopic observations with the iSHELL spectrograph at the NASA Infrared Telescope Facility (this work), along with complementary NIRSPEC spectra acquired at the W. M. Keck Observatory (Bonev et al. presentation in this meeting). These data represent the best opportunity for studying 67P until its next favorable apparition in 2034. The data include pre-perihelion, near-perihelion, and post-perihelion dates spanning October-December 2021. The goals of our study include comparing ground-based measurements of global coma composition to abundances derived by Rosetta (in order to place ground based and space-based observations in context), testing potential pre- and post-perihelion asymmetries in outgassing as observed by Rosetta, and resolving discrepancies in the CH₃OH abundance reported by the ROSINA and MIRO instruments. In this presentation, we report rotational temperatures, production rates and abundances (or meaningful upper limits) for H₂O, C₂H₆, HCN, C₂H₂, NH₃, CH₃OH, and H₂CO. We compare our results to the Rosetta measurements of coma composition as well as to other comets studied with near-infrared techniques.

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