ISO PHOT and SWS Spectra of Classical Novae in Outburst

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Abstract

The rationale for making photometric and spectroscopic observations of classical novae in outburst using the Infrared Space Observatory ISO is reviewed. These observations can be used to quantify parameters describing the outburst and to determine metal abundances in the ejecta. Special emphasis will be give to temporal phases exhibited by some novae during which the ejecta are strongly cooled by near- and mid-IR radiation from forbidden line radiation from highly ionized ("coronal") atomic states. During these episodes, ISO SWS spectra can be used to determine abundances of important metals that are produced in the thermonuclear runaway that leads to the outburst. These include CNO, Ne, Mg, Al, and Si. We compare the abundances deduced from recent IR observations with theoretical predictions. The SWS spectra also provide velocity information that can be used to reconstruct the dynamics of the ejected shell. ISOPHOT photometry from 5 to 200 microns can in principle be used to test for the presence of persistent forbidden line and dust emission long after the outburst. We present preliminary analysis of SWS spectra of Nova Cru 1996 and Nova Sgr 1996. A wealth of dynamical data describing the physical structure of Nova Cru's ejecta can be gleaned from these observations. A very rough preliminary analysis of PHOT observations of LV Vul, V528 Aql, and V1378 Aql will be presented. It will be shown that serious calibration problems must be overcome before these data can be interpreted scientifically. These data are being presented on behalf of the US PROP_164 Nova team (R. D. Gehrz, P. I.) , the US ToO Nova team (R. D. Gehrz, P. I.), The European Nova Team (M. J. Barlow, P. I.), and the Joint US/European ToO Nova Team (R. D. Gehrz, P. I.). Final results and scientific analyses will be published by these teams at a later date.