COSMIC PETROLOGY: COMPARISON OF CIRCUMSTELLAR DUST WITH SOLAR SYSTEM EXTRATERRESTRIAL MATERIALS.

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Introduction: Remote infrared observations allow us to obtain mineralogical information about micron-sized dust in circumstellar environments like young stellar objects (YSO). Comparison to laboratory infrared measurements of meteorites material from the time when our own Solar System was an YSO provides a link between astronomical observations with the known compositions of extraterrestrial materials in our Solar System.

Data Sources and Processing: We compare the IR spectra of two YSOs [1-4] with the modal mineralogical composition of bulk chondrites and their major components compiled from literature data [5-8]. An important caveat is that the spectral features used to model the mineralogical composition of circumstellar dust in the mid-infrared come from fine-grained dust in the micron size range. This means that the composition of larger components (e.g., bulk chondrules) cannot be determined using this technique. Since we expect mixtures of different materials in the dust, we used the HMX [9] software to calculate the best mixture of meteorites to fit the dust compositions.

A limiting factor is the number of mineral phases available in both data sets. The number of minerals used to calculate the composition in astronomical observations is usually very low, mostly limited to amorphous and crystalline ferromagnesian olivines, pyroxenes and silica. For meteorite data, quantitative information about the contents of amorphous components is very rare, partly due to difficulties to identify such phases in modal analyses of meteorites. So in many cases the two datasets only overlap for the crystalline species.

Results and Discussion:

System	**HD179218 [1-3]**	**HD169269 [1-4]**
Type	Herbig	Herbig
Age (Myr)	1.3	5.0
Circumstellar Dust (norm. mass%)	Olivine 37 Pyroxene 41 Silica 22	Ol 67/Pyx 21/Sil 12
Best Fit Meteorites (components >10 wt%)	Matrix Acfer094 Si-rich Fragments	Matrix Acfer094 Bulk R3 Si-rich Fragments

Results of our preliminary calculations indicate that the primitive materials in the two circumstellar disks could be similar to that of primitive meteoritic materials of Acfer 094, bulk R3 chondrites and Si-rich fragments (mostly differentiated materials [7,8], but necessary to match the silica-rich component).

References: [1] van Boekel R. et al. 2005. *Astronomy & Astrophysics* 437:189-208. [2] Bouwman J. et al. 2001. *A&A* 375:950-962. [3] Schegerer et al. 2006. *A&A* 456:535-548. [4] Bouwman J. et al. 2000. *A&A* 360:213-226. [5] Greshake 1997. *Geochimica et Cosmochimica Acta* 61:437-452. [6] Kallemeyn et al. 1996. *GCA* 60: 2243-2256. [7] Bischoff et al. 1994. *Meteoritics* 29:264-274. [7] Bischoff et al. 1993. *Meteoritics* 28:570-578. [8] Bridges et al. 1995. *Meteoritics* 30:715-727. [9] Stoeckelmann et al. 1989. *Math.Geol.* 21:853-860.