

Space Science Seminar
Tuesday, 2016 October 18
10:30 a.m.
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The Origin of Chondrules

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Host: Dr. Bastian Baecker (sponsored by ZP13)

Chondrules are submillimeter-size igneous spherules that occur in the major chondrite groups (wherein each chondrite group is thought to be derived from a separate undifferentiated asteroid). Chondrules are abundant; they constitute up to 75 vol.% of ordinary chondrites (the most common meteorites observed to fall) and are among the oldest solids to form in the Solar System. These spherules consist mainly of phenocrysts of the Mg-Fe silicates olivine and pyroxene embedded in glass; the glass represents the residual liquid from which the phenocrysts crystallized. Also common in the chondrules are small blebs of metallic Fe-Ni and Fe-sulfide. Chondrules were produced in the solar nebula by the flash melting of porous silicate-rich dustballs. Detailed petrographic analysis of chondrules in different chondrite groups has revealed that many chondrule properties (e.g., size, texture, presence of rims, abundance of sulfide) are inter-correlated, allowing the assignment of relative formation locations (as a function of heliocentric distance) to these groups. Recent petrologic studies of chondrules have shown that many of the olivine and pyroxene phenocrysts have numerous overgrowth layers suggesting that typical chondrules were partly melted multiple times. A plausible heat source is nebular lightning.

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