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Calculating protoplanet collisions in the early solar system PAUL S. DE CARLI, SRI international, ZHIDONG XIE, Nanjing University, Nanjing, China, THOMAS SHARP, Arizona State University — We study shock-synthesized high-pressure phases in meteorites in infer the conditions under which they formed. These phase are found in or adjacent to locally melted veins or pockets that formed on shock compression. The melt veins cooled by conduction to adjacent cooler material. We use static high pressure data to establish the pressure range over which the melt solidified and cooled and the observed phases formed. One may then calculate the shock temperature of the cooler material. In general, we know only that the initial temperature of the melt vein lies above the liquidus. In a recent observation, we have found a secondary melt zone adjacent to a vein. The width of this zone provides a measure of the peak temperature of the melt vein. Calculations of the thermal and pressure history of the melt vein indicates that this meteorite was subjected to shock pressures in the range of 18-22 GPa for a duration of at least a second. We use the Autodyn(TM)code to calculate impacts between meteorite parent bodies in the early solar system. We infer that this meteorite must have been at a depth of at least 10 km at the time of the impact that produced the observed high-pressure phases.

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