Vortex pinning in single crystal CaC$_6$ ULRICH WELP, DANIEL ROSENmann, RUOBING XIE, DAVID HINKS, HELMUT CLAUS, GORAN KARAPETROV, JOHN SCHLUETER, WAI-KWONG KWOK, Argonne National Laboratory, Argonne, IL 60439, LISA PAULIUS, Western Michigan University, Kalamazoo, MI 49008 — Crystals of the new graphite intercalation superconductor CaC$_6$ were synthesized in a liquid transport process in which graphite single crystals are exposed to an eutectic Ca-Li melt at 350 °C. The resulting samples displayed a sharp superconducting transition at 11.6 K. X-ray diffraction reveals the rhombohedral CaC$_6$ structure with no indication of graphite second phases. The phase diagram and the vortex pinning properties were determined using magnetization and Hall magnetometry measurements. The irreversibility line for fields applied along the c-axis lies close to the upper critical field and displays down to temperatures of 2 K a linear temperature dependence with a slope of about -230 G/K. An analysis based on the Bean critical state model yields a critical current density of $10^4$ A/cm$^2$ at 4.5 K and zero field. The effect of particle irradiation on the flux pinning properties of CaC$_6$ will be presented. This work was supported by the US Department of Energy, BES-Materials Sciences, under Contract DE-AC02-06CH11357.