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Spin-Exchange Optical Pumping of Alkali Salts¹ BEN OLSEN, BRIAN PATTON, YUAN-YU JAU, WILL HAPPER, KIYOSHI ISHIKAWA², Princeton University — Spin-Exchange Optical Pumping (SEOP) is a technique used to polarize nuclei in excess of their equilibrium limit. SEOP is achieved by optically pumping an alkali vapor which then transfers angular momentum to the nuclei of interest. We have recently hyperpolarized ¹³³Cs nuclei in solid CsH using SEOP, achieving magnetizations more than an order of magnitude larger than the thermal equilibrium value.³ In subsequent work, we investigate the mechanisms underlying this transfer of angular momentum. By optically pumping Cs vapor with laser light resonant with several optical transitions, each yielding different nuclear and electronic spin currents to the solid, we attempt to determine the source of transferred angular momentum. Early evidence suggests both electronic and nuclear spin polarization in the vapor contribute to ¹³³Cs nuclear polarization in the salt. The ¹H polarization is also mildly affected by optical pumping. We compare these results to numerical simulations and to results from other alkali salts. Further studies are warranted to discover if polarization can be transferred to other nuclei (e.g., alkali salts) on the cell walls.

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²Present address: Graduate School of Material Science, Hyogo, Japan

³Ishikawa *et. al.*, Phys. Rev. Lett. **98**, 183004 (2007)

Ben Olsen
Princeton University

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