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Rapid Production of Hyperpolarized ^{3}He Gas for MRI[1] BENJAMIN C. ANGER, University of Utah, RICHARD E. JACOB, KEVIN R. MINARD, Pacific Northwest National Laboratory, BRIAN T. SAAM, University of Utah — Hyperpolarized (HP) ^{3}He gas created via spin-exchange optical pumping (SEOP) is widely used as a signal source in MRI applications. One drawback to conventional SEOP is the time required for polarization. The process normally requires 10 - 20 hours to achieve 40-50% polarization in enough gas ($\sim$1 L) for a single imaging experiment. Two recent advances in the physics of SEOP have led to dramatic enhancements in polarization efficiency: the use of spectrally narrowed diode-laser arrays and hybrid SEOP, which employs both potassium and rubidium as alkali-metal intermediaries. We have combined these techniques in constructing two polarizers, a prototype system at Utah and a more fully engineered system at PNNL. We report >60% ^{3}He polarization in 0.5 bar$\cdot$L of gas in valved and refillable glass cells, achieved in under 4 h. With the apparatus described we are able to produce several liters of polarized ^{3}He per day.

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