

### SFB – Colloquium

Speaker: **Prof. Dr. Brian Saam**

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Date: Tuesday, 19 July 2022, 14:15, H34

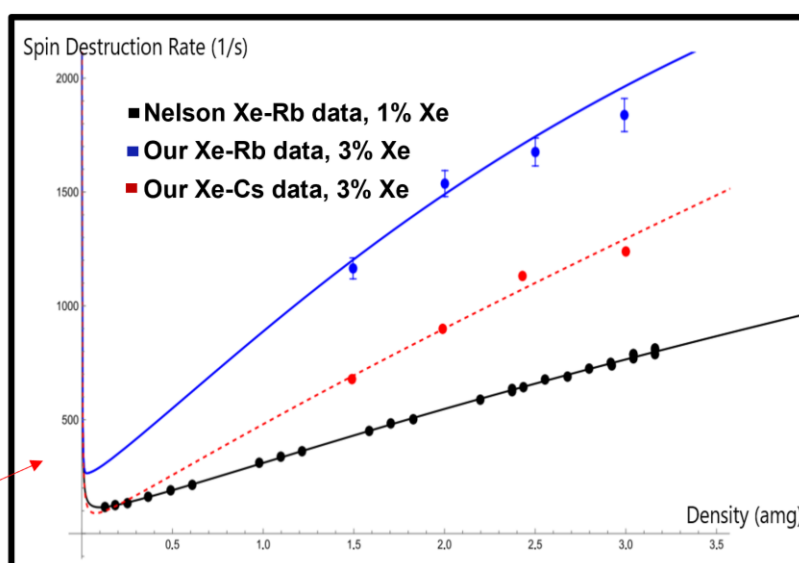
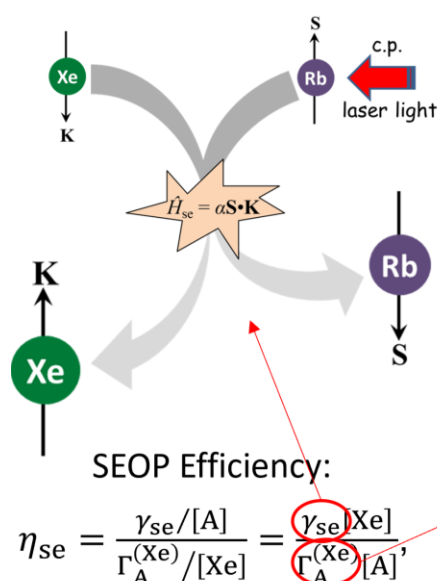
Topic: Spin Physics in Alkali-Metal Vapors



#### Abstract:

A relatively simple electronic structure that is optically accessible and precisely characterized has led to rich study and application of alkali-metal ensembles, from clocks to Bose-Einstein condensation; Rydberg spectroscopy to precision magnetometry. Spin-exchange optical pumping (SEOP) produces nuclear-spin-polarized noble gases ( $^3\text{He}$  and  $^{129}\text{Xe}$ ) with applications to searches for new physics, gyroscopy, and human-lung imaging, among others. We use optically detected EPR spectroscopy of the alkali-metal hyperfine structure to characterize both the alkali-metal and noble-gas magnetizations, as well as the relevant spin-exchange and spin-destruction rates. We will look in detail at the angular-momentum transfer that occurs in SEOP and our measurements of its efficiency: the fraction of spin that is transferred from the alkali metal electron to the noble-gas nucleus vs. that which is destroyed by other mechanisms in the encounter.

Host: Prof. Dr. John Lupton



SEOP efficiency is the alkali-metal—noble-gas spin-exchange rate divided by the alkali-metal spin-destruction rate. The results here indicate that Cs is a better SEOP partner for Xe than Rb.