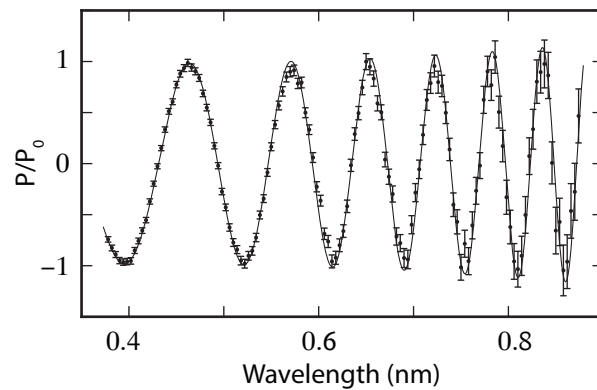


## Supplementary Figure



Supplementary Fig 1: **Normalized Neutron Polarization.** A fit of the normalized neutron polarization as a function of neutron wavelength ( $\lambda_n$ ) as described in the Methods section. The error bars are standard deviations deduced from counting statistics. For the data shown, the energy phase deduced from the RF frequency was  $\gamma = -1.00\pi$ . The fitted value for the path phase is  $\chi = -1.06\pi$  and for the spin plus energy phase is  $\alpha + \gamma = -2.01\pi$ .