



Magnetic holding field and Life Time of Polarized ^3He Neutron Spin Filter Cells

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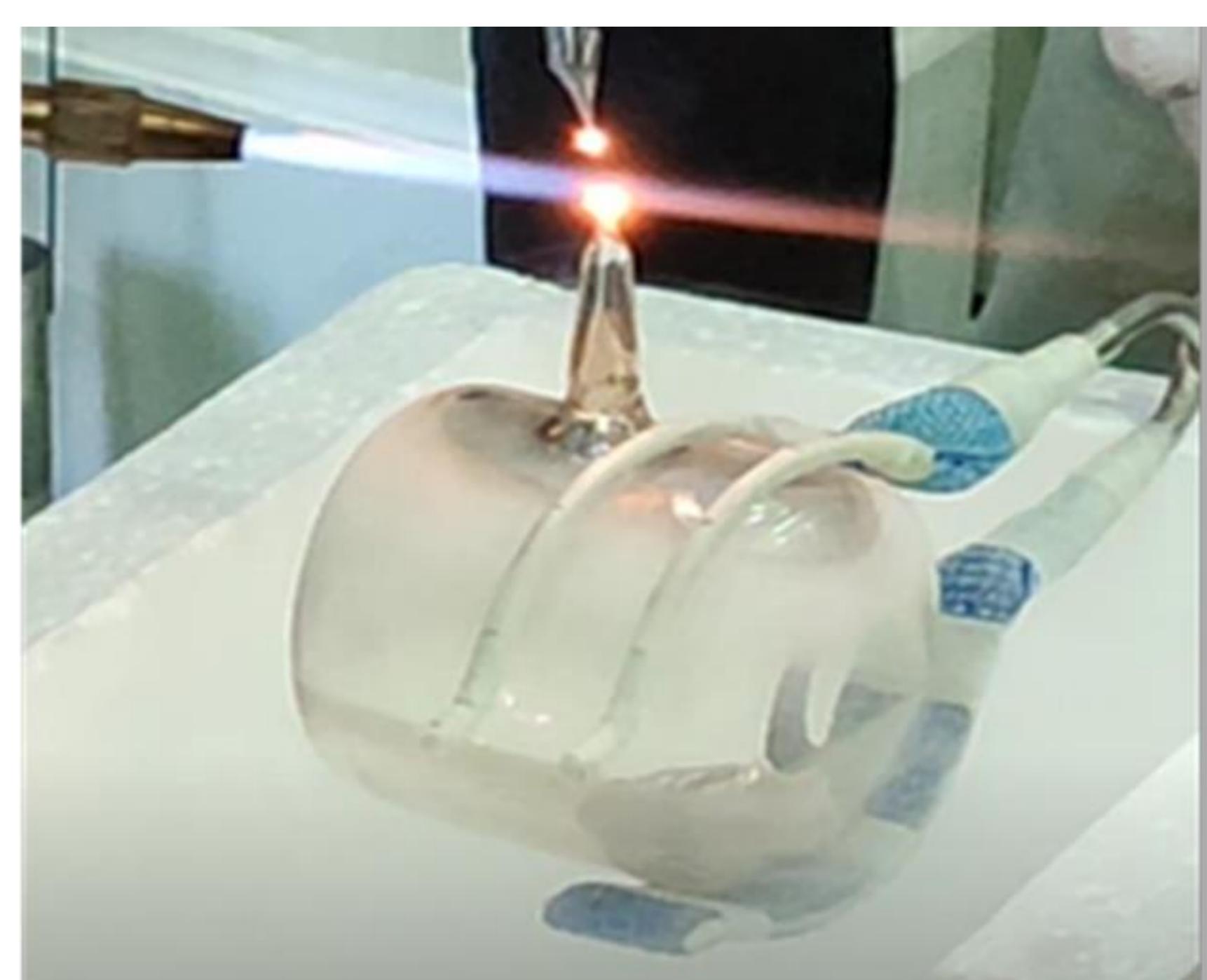
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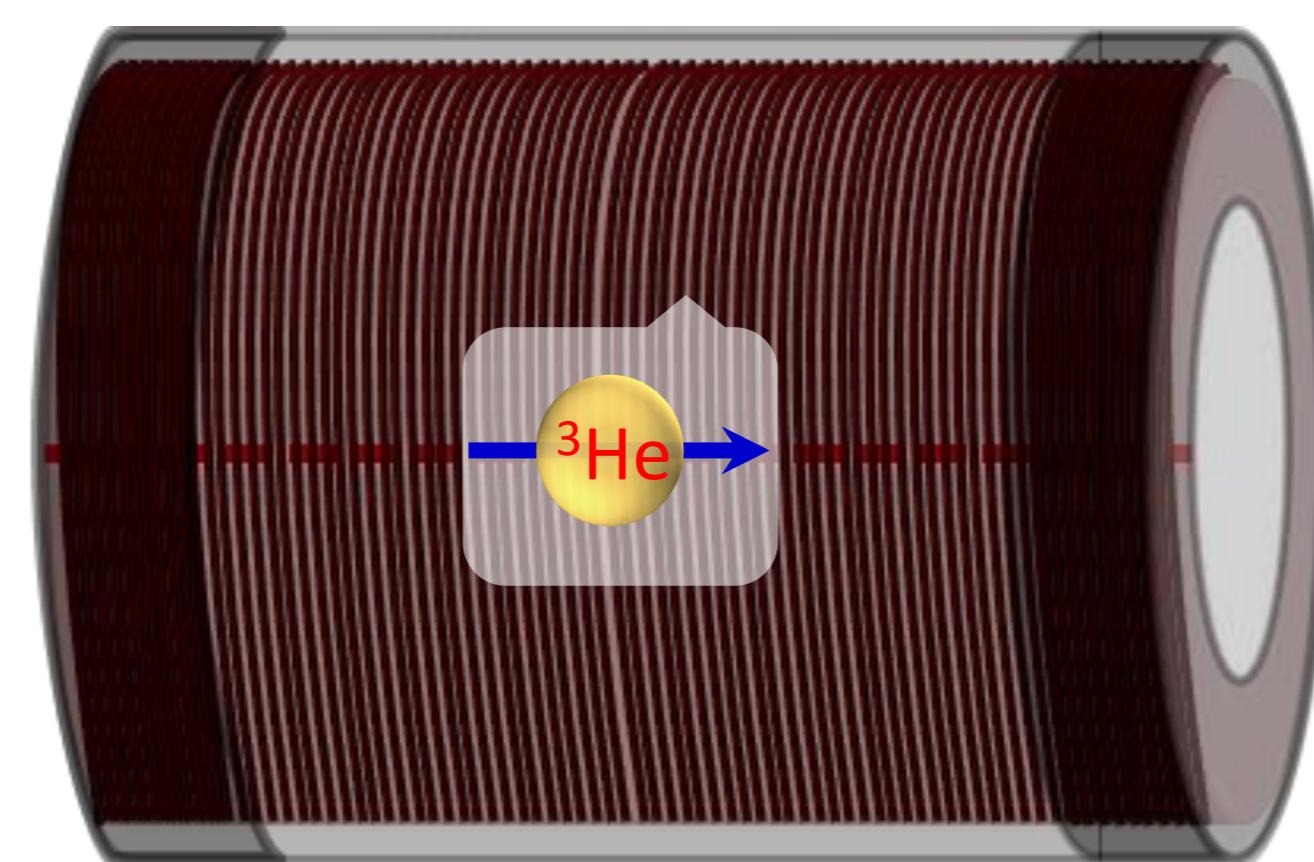
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Introduction



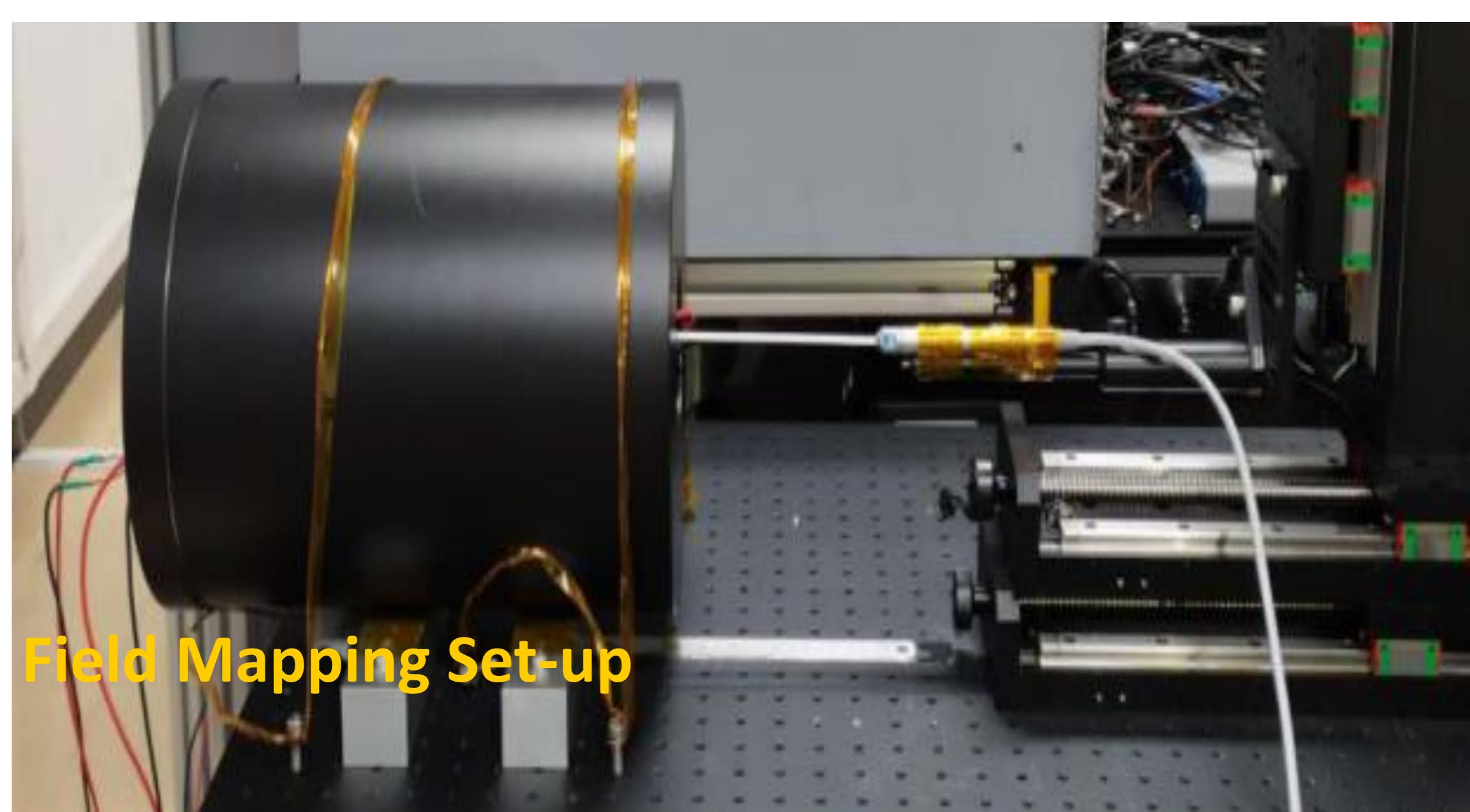
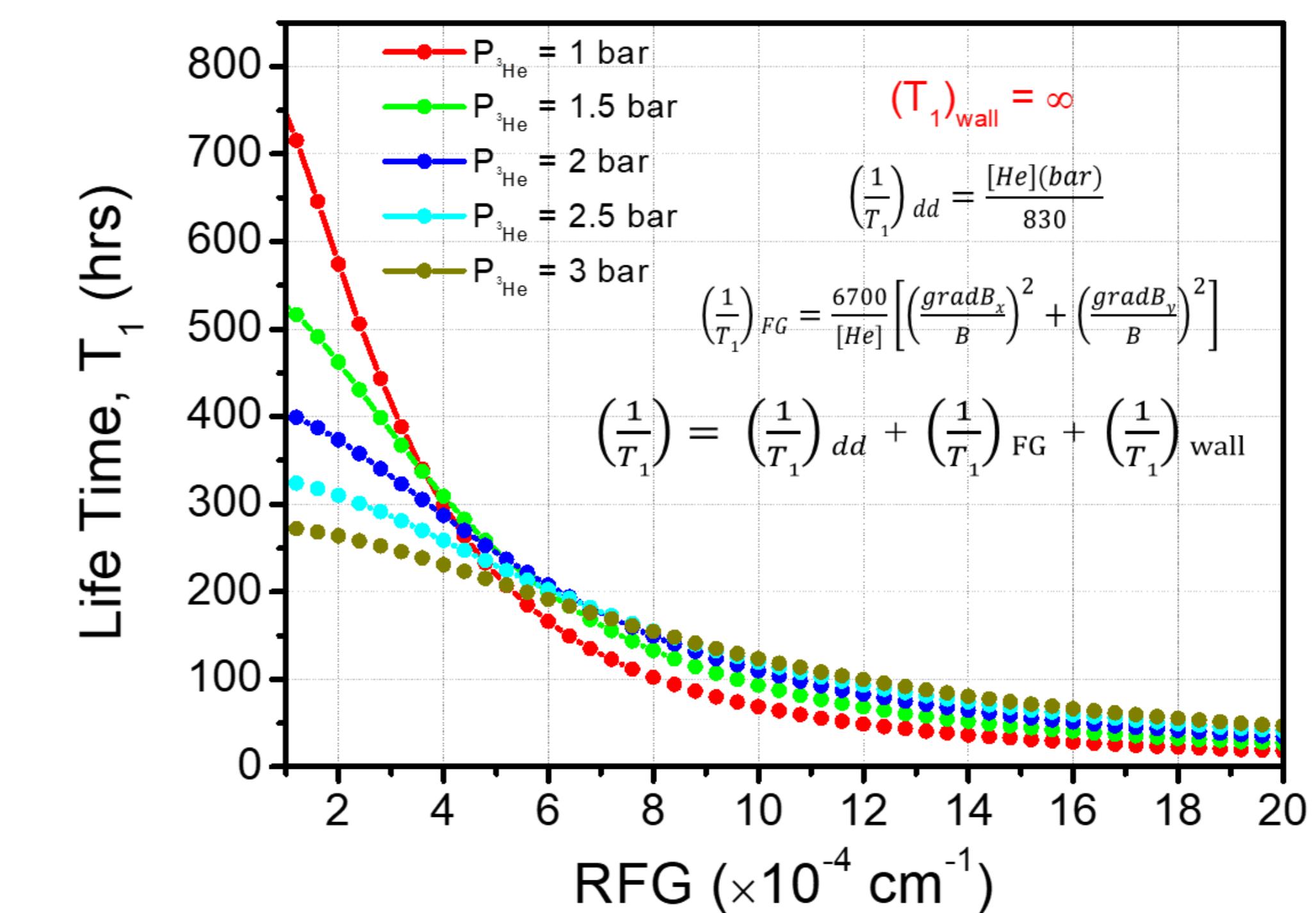
μ -metal shielded Solenoid



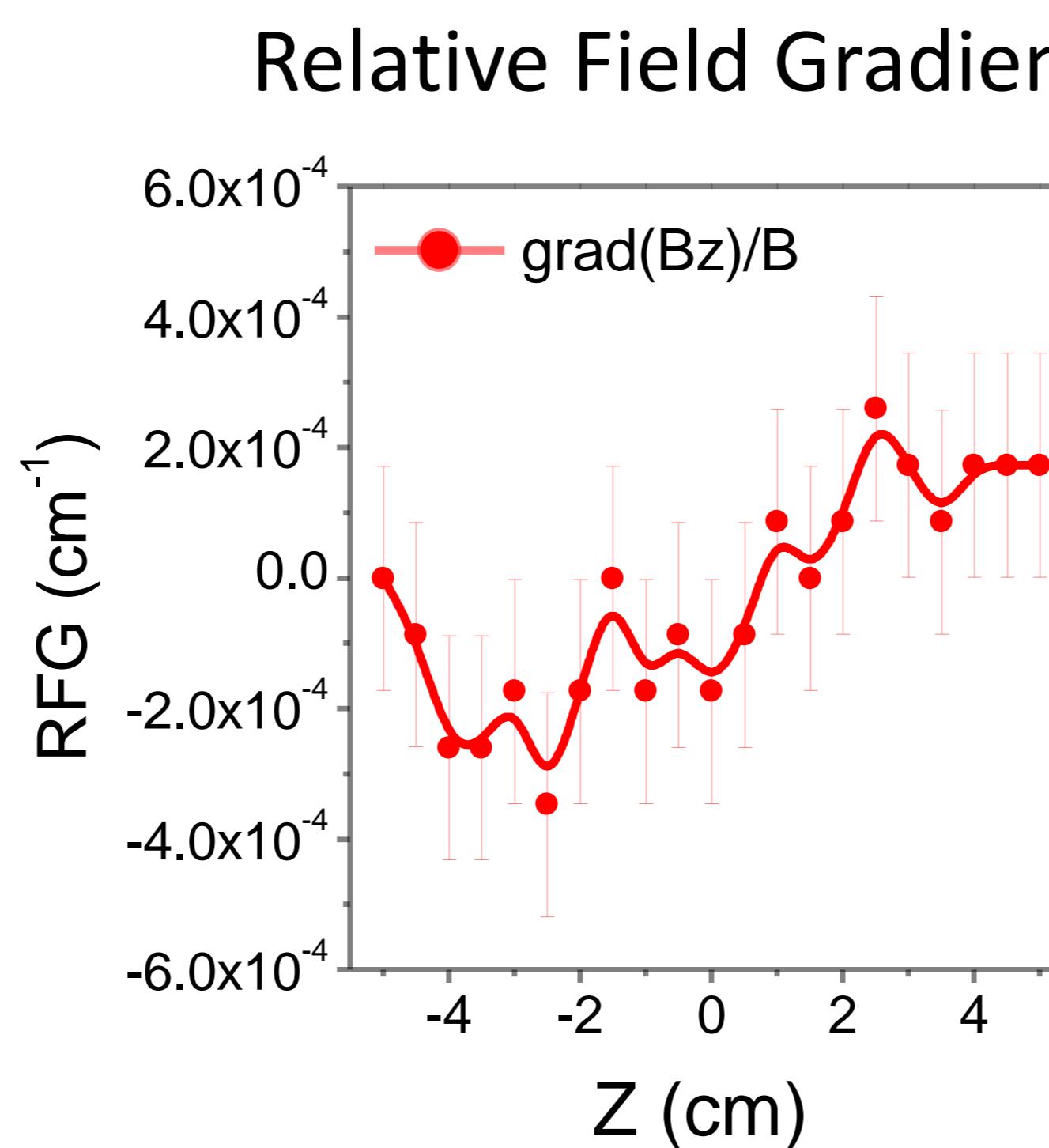
Life time of the ^3He NSF cell

$$\left(\frac{1}{T_1}\right) = \left(\frac{1}{T_1}\right)_{dd} + \left(\frac{1}{T_1}\right)_{FG} + \left(\frac{1}{T_1}\right)_{wall}$$

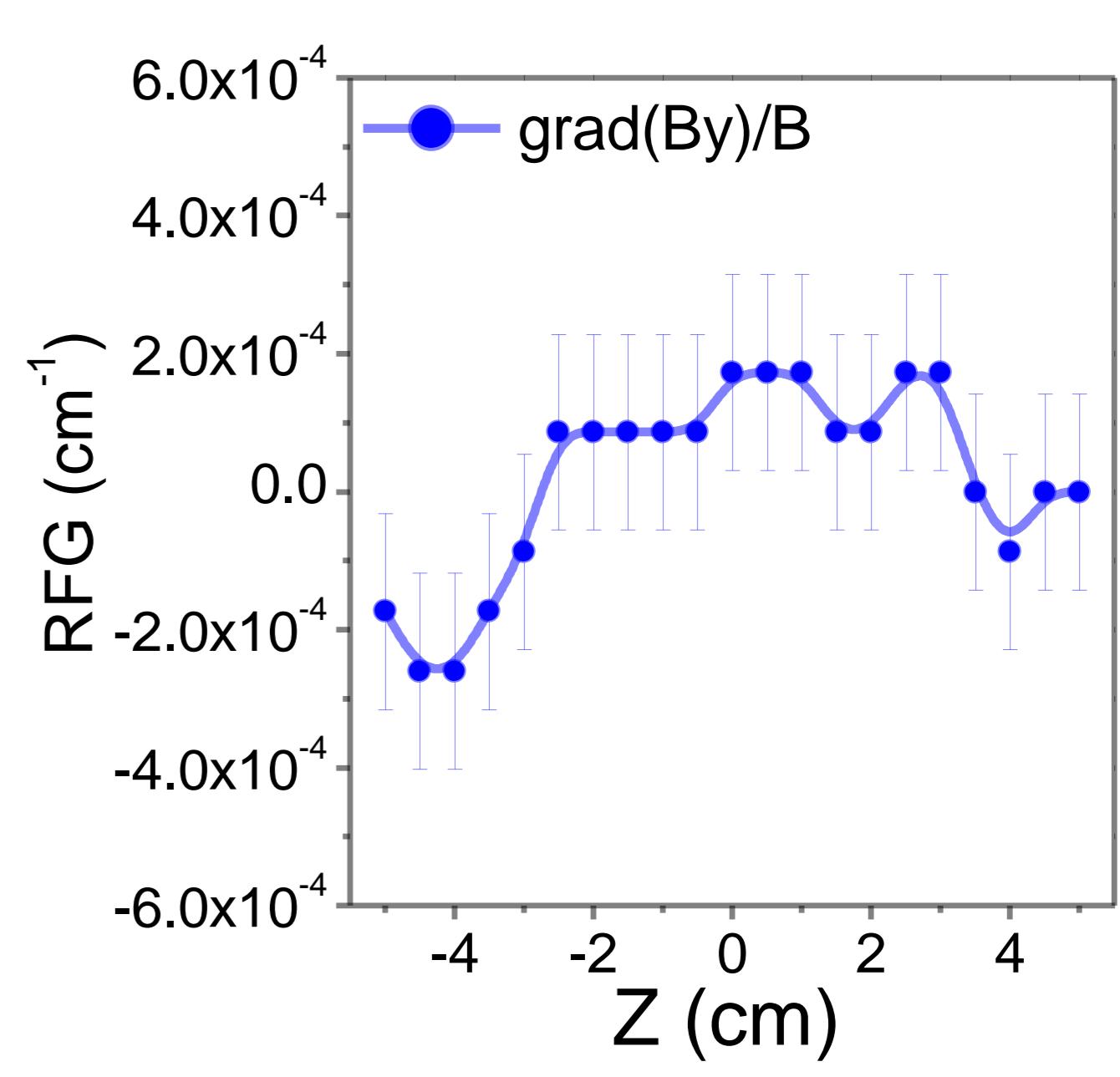
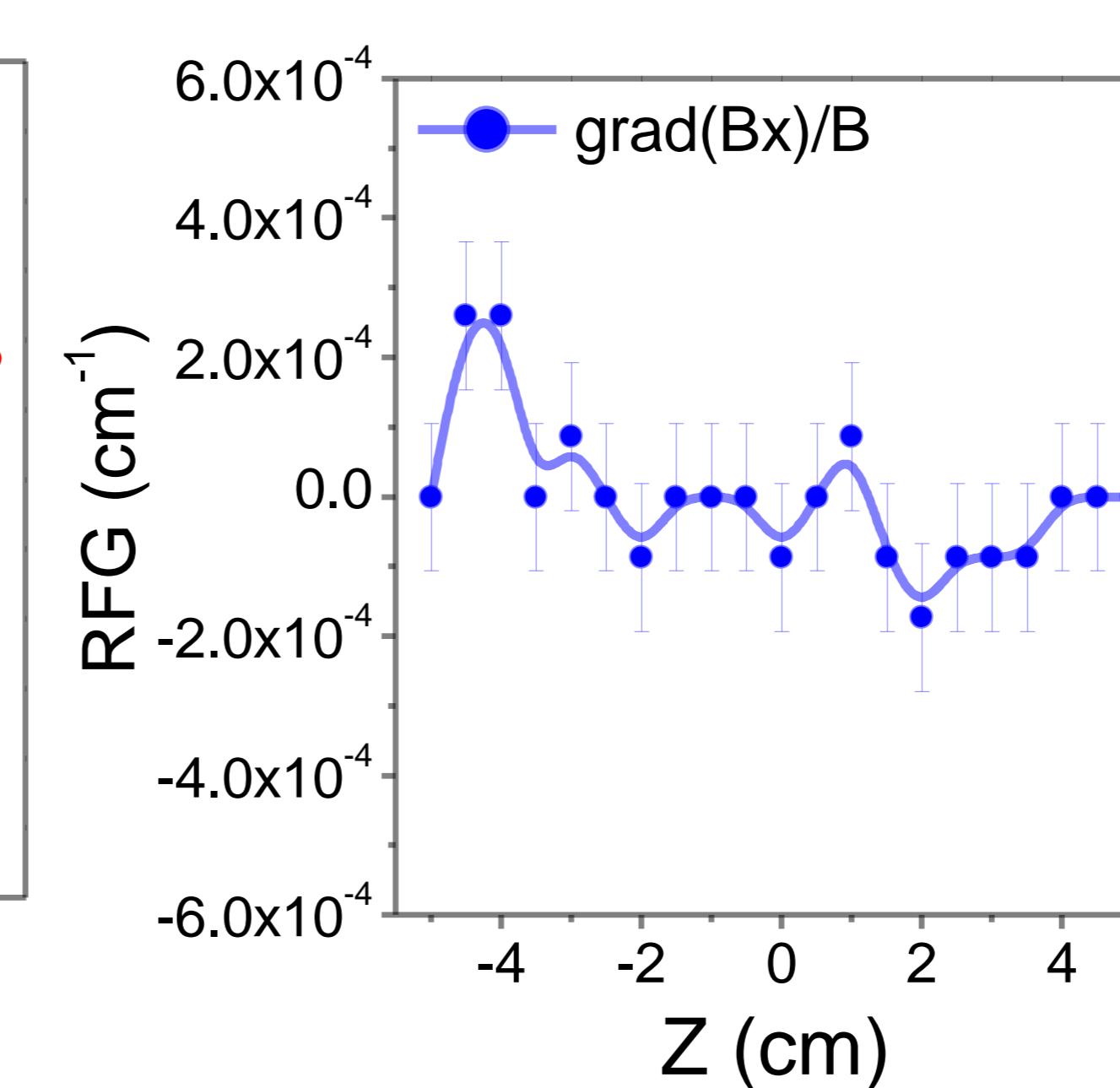
Field gradient dependence on the life time of the cell



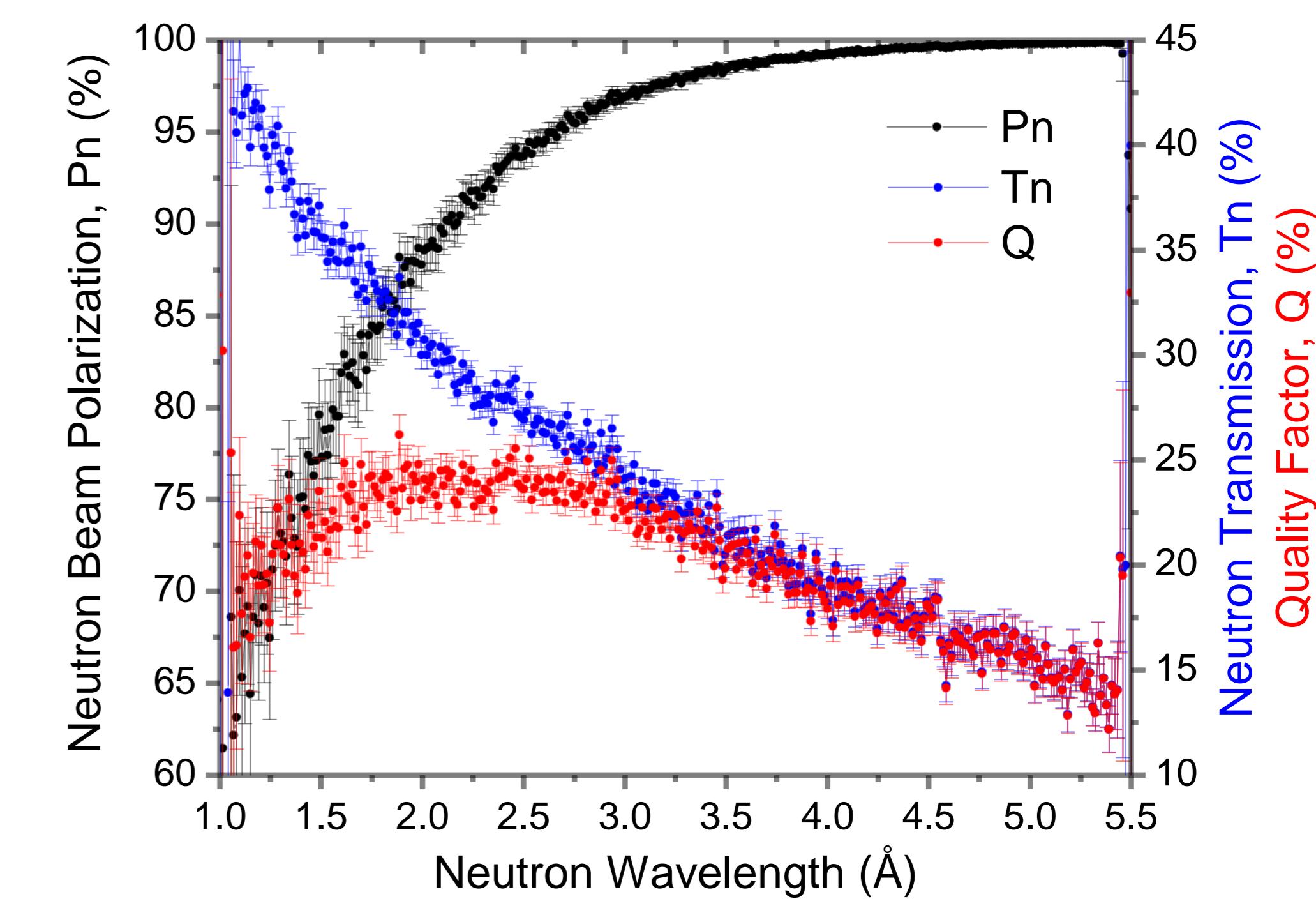
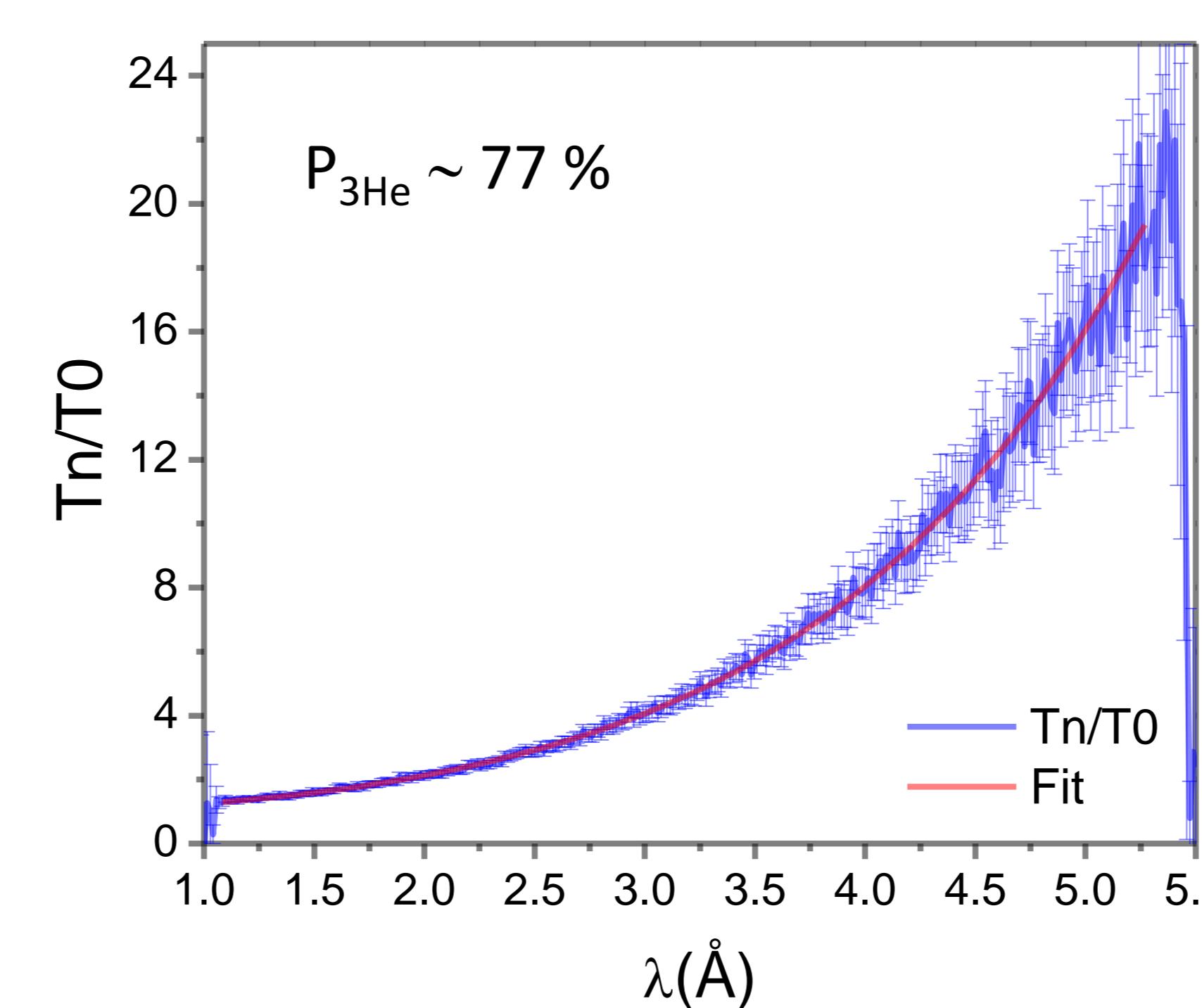
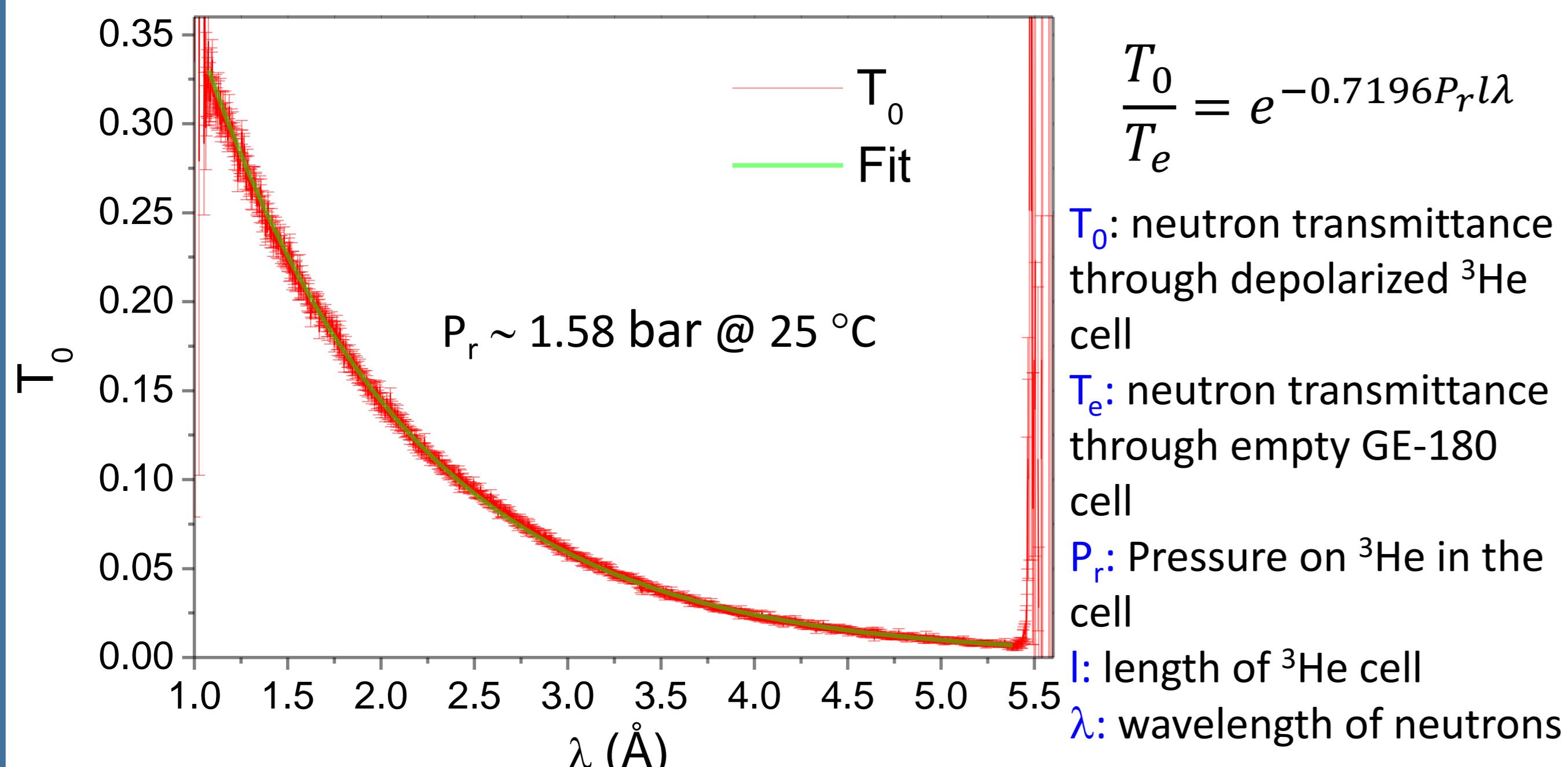
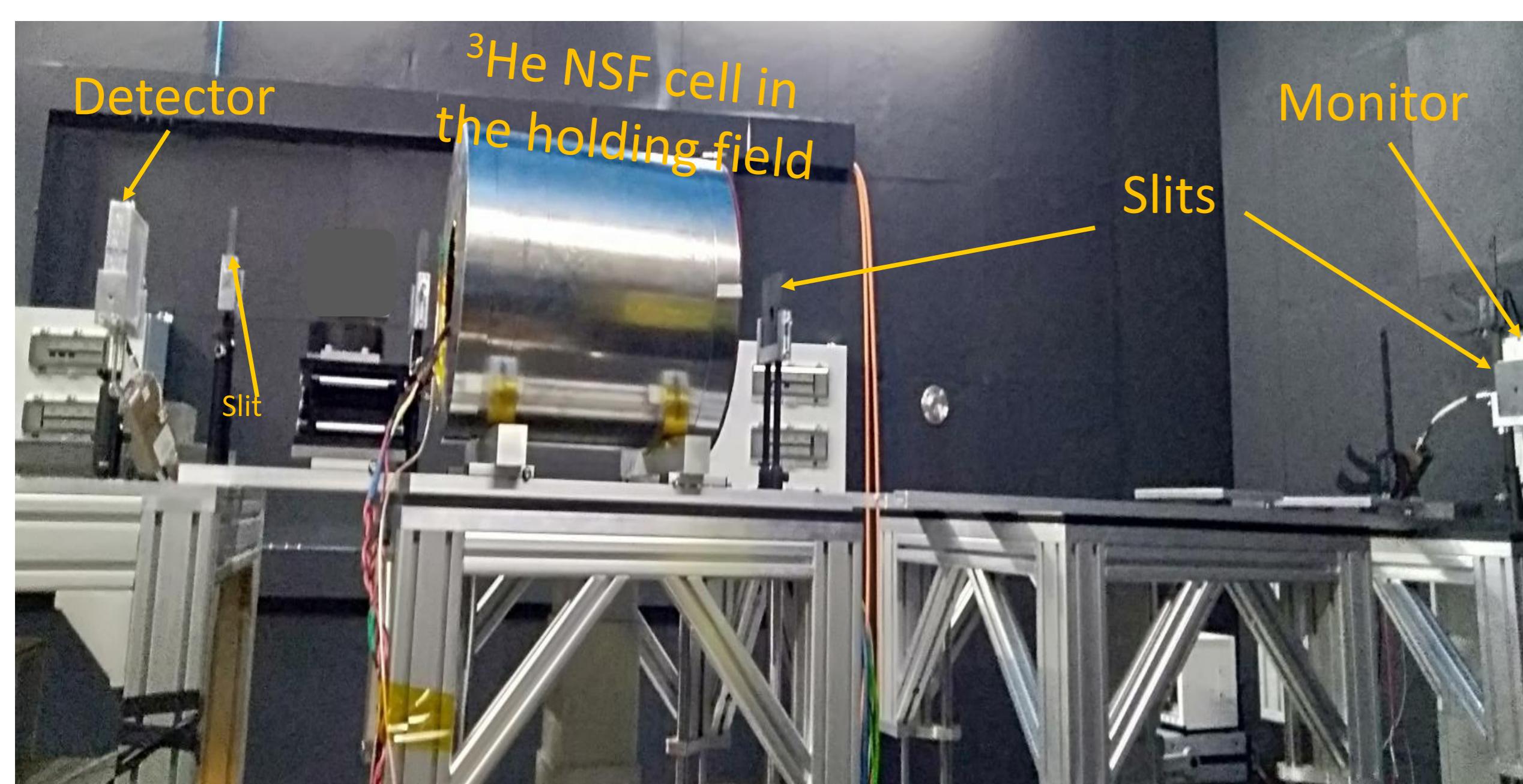
Field Mapping Set-up



Relative Field Gradient (RFG) measured using Teslameter.



Performance Test



$$\frac{T_n}{T_0} = \text{Cosh}(0.7196 P_r l P_{^3\text{He}} \lambda)$$

T_n : neutron transmittance through polarized ^3He cell
 $P_{^3\text{He}}$: Polarization of ^3He in the NSF cell

$$\text{Quality factor } Q = T_n * P_n^2$$

P_n : Polarization of neutron beam through the Polarized ^3He cell

$$P_{^3\text{He}}(t) = P_{^3\text{He}}(0) e^{-t/T_1}$$

Polarization of ^3He in the NSF cell was measured using neutron transmittance keeping the cell in the magnetic holding field

