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Title: Testing SuperSymmetry with Neutron Decay

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Abstract Submitted
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Testing Supersymmetry with Neutron Decay W.S. WILBURN, V. CIRIGLIANO, A. KLEIN, P.L. MCGAUGHEY, M.F. MAKELA, C.L. MORRIS, J. RAMSEY, A. SALAS-BACCI, A. SAUNDERS, Los Alamos National Laboratory, L.J. BROUSSARD, Duke University, A.R. YOUNG, North Carolina State University — It has been recently realized that the neutrino correlation parameter B in neutron decay is sensitive to Minimal Supersymmetric Models for the case of maximal mixing. B is currently known to a precision of 3×10^{-3} , but a precision of better than 1×10^{-3} is required to test these models. Improvements in experimental techniques developed for the ongoing UCNA experiment and the planned abBA experiment may allow an improved measurement of B with a precision approaching 1×10^{-4} . An emerging concept for combining these techniques into an experiment to measure B using ultracold neutrons and large-area silicon detectors will be discussed.

- Prefer Oral Session
 Prefer Poster Session

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Testing Supersymmetry with Neutron Decay

L.J. Broussard *Duke University*

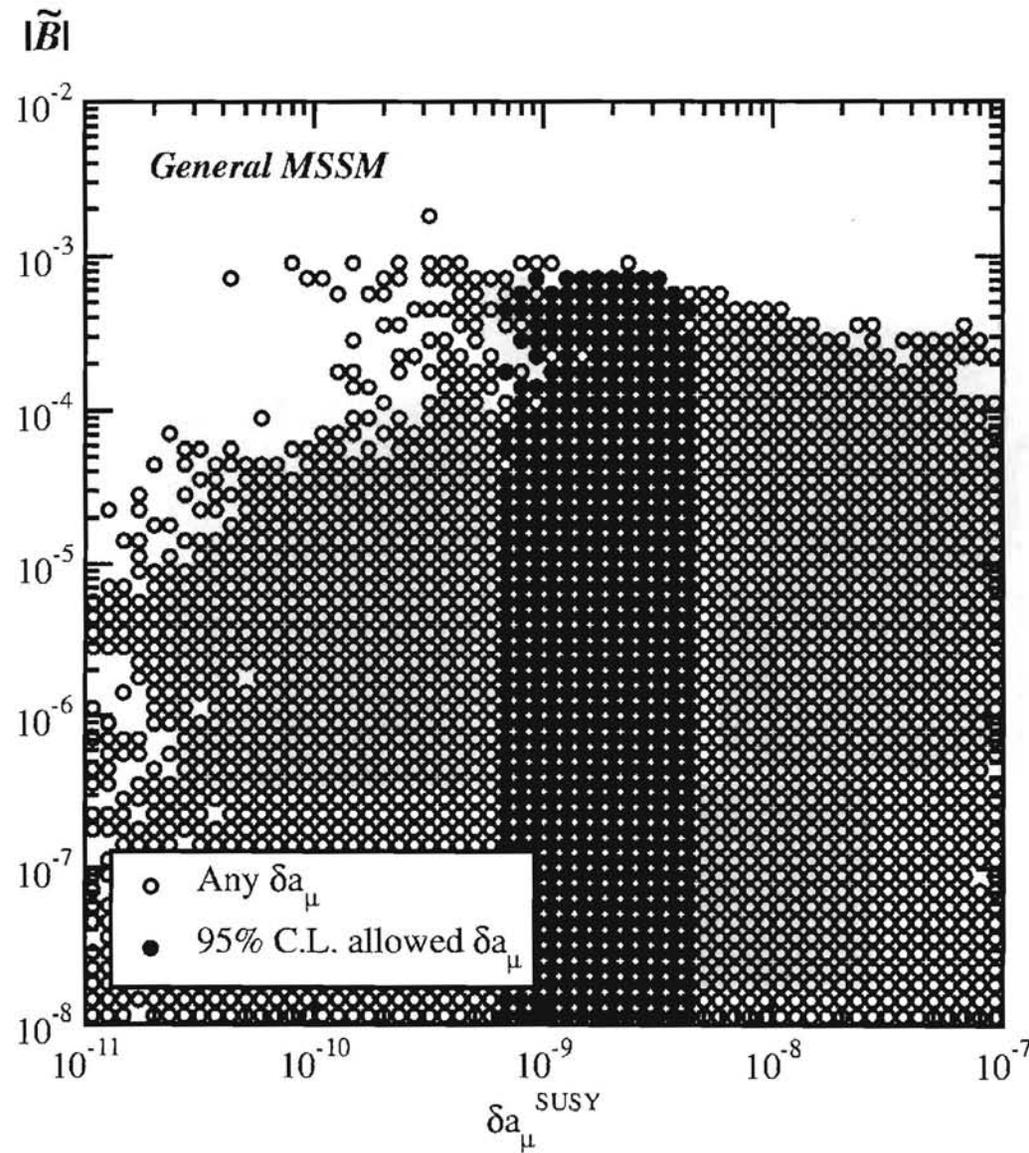
**V. Cirigliano, M.F. Makela, P.L. McGaughey, C.L. Morris,
J. Ramsey, A. Salas-Bacci, A. Saunders, and W.S. Wilburn**
Los Alamos National Laboratory

A.R. Young *North Carolina State University*

Three Miracles

- B is sensitive to SuperSymmetry
 - Induced scalar coupling
- Neutron polarimetry $< 1 \times 10^{-3}$ possible
 - UCNA experiment shows possibility
- Large area silicon detectors now exist
 - Developed for Nab and abBA experiments

Sensitivity of B to Supersymmetry

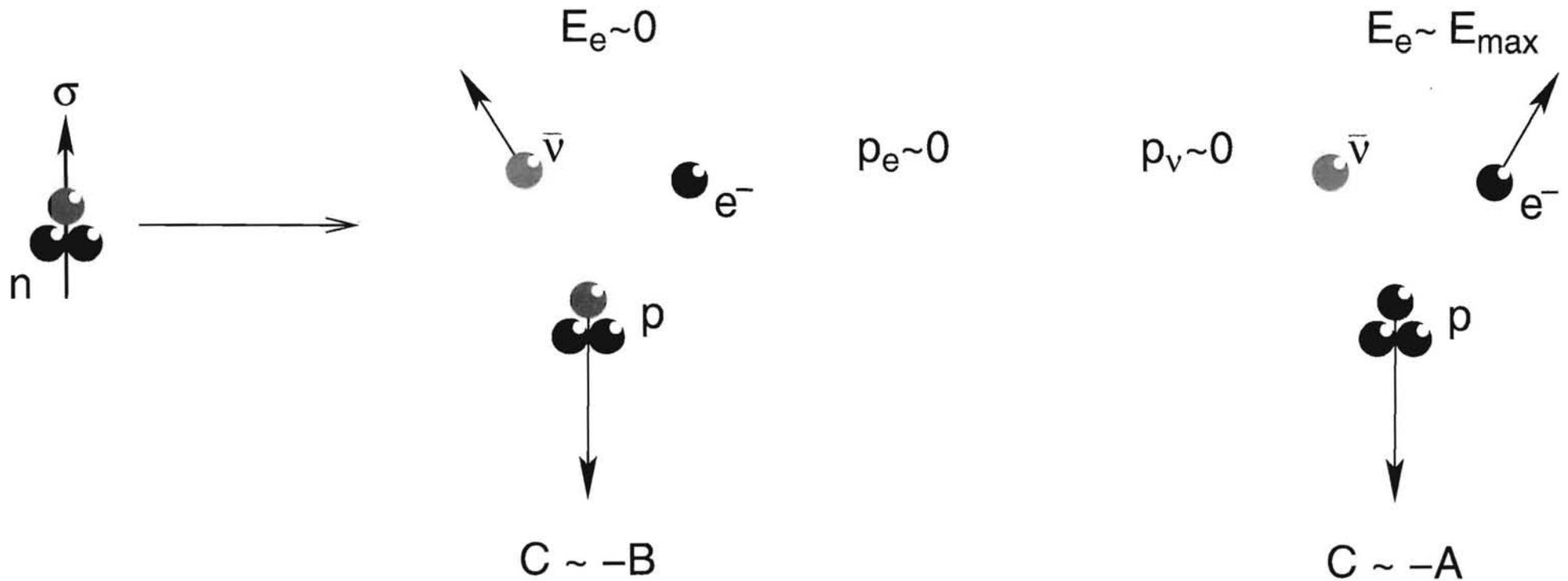


S. Profumo, M.J. Ramsey-Musolf, and S. Tulin. PRD 75, 075017 (2007).

Current Status of B Parameter

PDG 2008	0.9807 ± 0.003
Achievable	± 0.001
Possible	± 0.0001

Determination of Neutrino Asymmetry B from Proton Asymmetry C



Measure C as a function of E_e

Ultracold Neutron Polarimetry

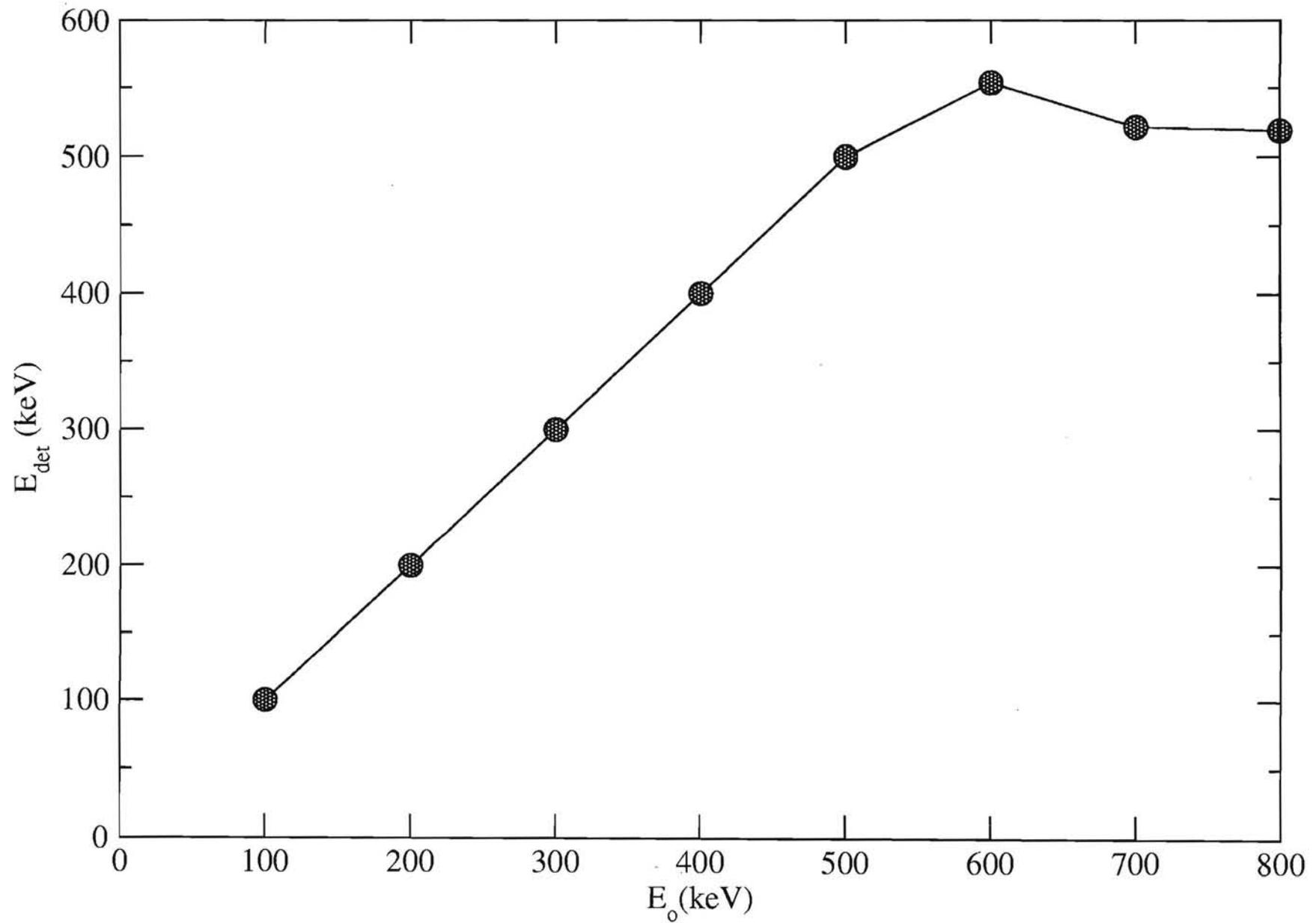
- UCNA has demonstrated $\Delta P_n = 1.3 \times 10^{-3}$
 - Small polarization correction $1 - P_n \leq ?$
- Improvements planned
 - Better measurement of depolarized fraction
 - Improved UCN guide coatings

First Prototype Silicon Detector

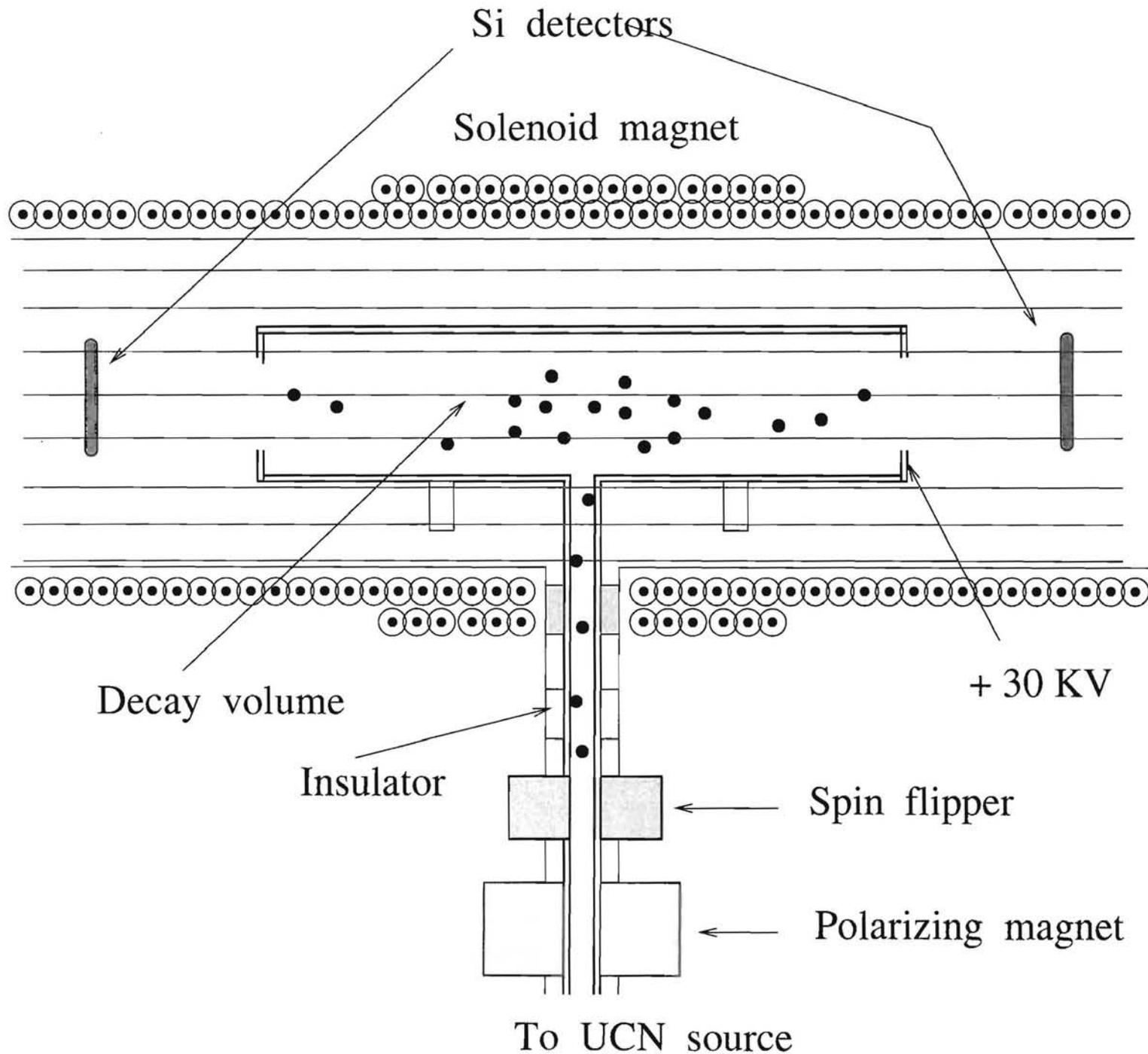


6" wafer, 0.5 mm thick (now 1.0 mm), 127 full pixels

Electron Energy Deposited in 1 mm Detector



Concept of Experiment



Systematic Uncertainty Estimates

	abBA (Calculated)	UCNA (Actual)
Neutron Polarization	0.5×10^{-3}	1.3×10^{-3}
Res. Gas Scatt.	$< 0.5 \times 10^{-3}$	N/A
<i>E</i> -Field Inhomogeneity	$< 0.1 \times 10^{-3}$	N/A
<i>B</i> -Field Inhomogeneity	0.3×10^{-3}	0.5×10^{-3}