

From: Tracy, Valerie  
Sent: Tuesday, December 13, 2005 9:56 AM  
To: Snyder, Dave W. (SDSTA); Severson, Trudy  
Subject: FW: ZEPLIN proposal for Homestake /Hanguo Wang/UCLA/liquid xenon as detector

-----Original Message-----

From: Hanguo Wang [mailto:wangh@physics.ucla.edu]  
Sent: Saturday, December 10, 2005 8:36 AM  
To: HLCP  
Cc: wangh@physics.ucla.edu  
Subject: ZEPLIN proposal for Homestake

To SDSTA,

This is to note that on behalf of the ZEPLIN collaboration that we will submit a LOI to HOMESTAKE for direct dark matter search using liquid xenon as detector material.

1) Title of your proposal,

ZEPLIN - a multi ton scale liquid xenon dark matter direct search program

2) List of participants (a partial list is fine),

DB Cline, WC Ooi, F Sergiempetri, H Wang\*, PF Smith, X Yang Physics and Astronomy department, UCLA

JT White, J Gao, J Maxin, G Salinas, R Bisst, J Miller J Seifert Department of Physics, Texas A&M University

T Ferbel, U Schroeder, F Wolfs, W Skulski, T Toke  
Department of Physics and Astronomy, Rochester University

Y Gao  
Physics Department, Southern Methodist University, Texas

B Camanzi, TJ Durkin, R Luscher, CG Neeson, RM Preece, NJT Smith Particle Physics Department, Rutherford Appleton Laboratory, UK

H Araujo, B Edwards, MK Joshi, V Lebedenko, I Liubarsky, TJ Sumner, C Thorne, JJ Quenby, R Walker Blackett Laboratory, Imperial College of Science, Technology and Medicine, London

MJ Carson, E Daw, VA Kudryavysev, TB Lawson, PK Lightfoot, PA Majewski, K Mavrokoridis, M Robinson, NJC Spooner Department of Physics and Astronomy, University of Sheffield, UK

AS Murphy, C Ghag  
Department of Nuclear Physics, University of Edinburgh

M Danilov, D Akimov, A Kovalenko, V Stekhanov  
ITEP, Modcow

V Chepel, A Lindote, MI Lopes, A Policarpo  
LIP-Coimbra, Physics Department, University of Coimbra, Portugal

3) A brief description of your proposed program,

The goal of ZEPLIN collaboration is to develop a multi ton scale liquid xenon based WIMP dark matter detector sensitive to below  $10^{-10}$  pb level. We are currently operating ZEPLIN II (30kg) in Boulby underground laboratory, UK and ZEPLIN III (7kg) on surface lab. The operation of ZEPLIN II and III will demonstrate the working principle of such detector technology and provide key information for next stage design. We intend to build an intermediate detector (100-1000kg) using information learned from ZEPLIN II and III to study final scale up to multi ton scale detector.

The intermediate detector will be studied during 2008/9 and we plan to build the final detector when the US DUSEL at homestake is ready.

4) A rough estimate of your space requirements and specific or unusual technical issues involved in your proposal,

The density of liquid xenon is  $3\text{g/cm}^3$ . So the fiducial volume for a 10 ton detector is only  $1.5\text{m} \times 1.5\text{m} \times 1.5\text{m}$ . Adding shielding veto, a target area of  $8\text{m} \times 8\text{m} \times 6\text{m}$  plus xenon recovery system  $5\text{m} \times 4\text{m} \times 4\text{m}$  (including purification system) and DAQ and control room (can be remote)  $6\text{m} \times 6\text{m} \times 3\text{m}$ .

5) An estimate of when you will require access to the underground facility, and

2010

6) Any other general requirements or questions for the experiment, research, or outreach activities.

Hanguo Wang

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