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Kalamazoo, MI, 49009 Transmission of 300-1000 eV electrons through a single cylindrically-shaped glass capillary of Borosilicate glass was studied [1,2]. The capillary had a diameter of ~0.20 mm and a length of ~15 mm. Transmitted electron intensities revealed three distinct regions with different characteristics: (1) for sample tilt angles (with respect to incident beam) less than 1 the transmission was dominated by the direct beam (no interactions with inner capillary wall), (2) for tilt angles between 1 and ~3.5 the majority of transmission was due to Coulombic repulsion by charge deposition at the capillary entrance, and (3) for tilt angles larger than 3.5 transmission was governed by inelastic scattering and as a result lost energy. Energy dependence and time evolution studies were carried out to seek more insight into the transmission process.

[1]B.S. Dassanayake *et. al.*, Phys. Rev. A 81, 020701(R) (2010).
[2]B.S. Dassanayake *et. al.*, Phys. Rev. A 83, 012707 (2011).

14:24

P5 3 Low energy (e,2e) studies from CH4: Results from symmetric coplanar experiments and M3DW theory* HAARI CH, *Missouri S and T* KATE NIXON, ANDREW MURRAY, *University of Manchester* CHUANGANG NING, *Tsinghua University* DON MADISON, *Missouri S and T* Low energy experimental and theoretical triply differential cross sections (TDCS) will be presented for electron impact ionization of Methane (CH4) for both the highest occupied molecular orbital (HOMO) and next highest occupied molecular orbital (NHOMO). The HOMO is a predominantly p-type orbital which is labeled 1t2 and the NHOMO is a predominantly s-type orbital labeled 2a1. Coplanar symmetric (symmetric both in final state electron energies and observation angles) will be presented for final state electron energies ranging from (1.4 eV, 1.5 eV) to (20 eV, 20 eV). The experimental results are in reasonably good qualitative agreement with theoretical M3DW (molecular 3-body distorted wave) calculations. The molecular results will be compared with the ionization of the 2s and 2p shells of neon which is the isoelectronic atom.

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14:36

P5 4 Remarkable Rise in Electron-Ion Recombination of O II for Low Temperature Nebular Plasmas* SULTANA NAHAR, *Ohio Statte U* ANIL PRADHAN, *Ohio State U* Recombination is dominant in cooler nebular plasmas and recombination lines (RCL) of O II are commonly detected. Collisionally excited lines (CEL) are also common. But a longstanding discrepancy of lower and higher oxygen abundance exists predicted from the RCL and CEL respectively. This is a puzzle since existent atomic parameters for O II are known to be accurate. We have studied the low energy photoionization and low temperature recombination of O II using the unified method based on relativistic Breit-Pauli R-matrix method and close coupling approximation. We find that the fine structure effects in the low temperature region, studied for the first time, cause considerable enhancement in electron-ion recombination rates. The enhancement comes from the intense narrow resonances, allowed in fine structure but not in LS coupling approximation, in a small energy region right at the ionization threshold. Due to the small energy range that contains these resonances, experiment was unable to detect them. We will present detailed features and recombination rates at low temperature which are expected to narrow the gap of discrepancy in oxygem abundance in nebular plasmas.

*Partial supports: NSF, DOE

14:48

P5 5 Imiging molecular dynamics of dissociative electron attachment to polyatomic molecules: ammonia, methane, and methanol* HIDEHITO ADANIYA, DANIEL SLAUGHTER, THORSTEN WEBER, ALI BELKACEM, *Lawrence Berkeley Lab* EXPERIMENTAL AMO GROUP TEAM Momentum imaging experiment is performed to study molecular dynamics of dissociative electron attachment (DEA) to the ammonia, methane, and methanol molecules for their well known resonances. The momentum spheres of the negative ion fragments, H^-,NH^-,$NH2^-$ from ammonia, H^-,CH^-,$CH2^-$ from methane, H^-,O^-,$CH3O^-$ from methanol, show unique angular distribution in their respective resonances, indicating each resonance involves different molecular dynamics.

*U.S. Department of Energy OBES, Division of Chemical Science

15:00

P5 6 Electron and Positron Scattering from Pyrimidine* P. PALIHAWADANA, J. MACHACEK, C. MAKOCHEKANWA, J. SULLIVAN, S. BUCKMAN, *CAMS, The Australian National University, Canberra, Australia* M. BRUNGER, *CAMS, Flinders University, South Australia* C. WINSTEAD, V. MCKOY, *Caltech, CA, USA* G. GARCIA, *CSIC, Madrid, Spain* F. BLANCO, *Universidad Complutense de Madrid, Spain* Pyrimidine ($C_4H_4N_2$) is a model molecule for studying both electron and positron interactions with DNA/RNA bases, as three of the five nucleobases (cytosine, thymine, and uracil) are pyrimidine derivatives. In this work we present absolute elastic differential cross sections for scattering of low-energy electrons (3-50 eV) by pyrimidine measured using a crossed electron-target beam apparatus at the Australian National University. Cross sections calculated using the Schwinger variational technique and a screening-corrected form of the independent-atom method are provided for comparison with the measured results. We also present absolute total and differential cross sections, recently measured at the positron beamline facility at the Australian National University, for positron scattering from pyrimidine. The measurements are taken using a magnetically confined positron beam (1-200 eV) with typical energy resolution of 60 meV. These measured cross sections are used to discuss key features between electron and positron scattering processes.

*This work was supported by the ARC, DOE, and JPL.

15:12

P5 7 Trends in Positron Interactions with Bio-Molecules* J.R. MACHACEK, P. PALIHAWADANA, C. MAKOCHEKANWA, J.P. SULLIVAN, *CAMS, Australian National University, Canberra, Australia* M.J. BRUNGER, *CAMS, Flinders University, South Australia* S.J. BUCKMAN, *CAMS, Australian National University, Canberra, Australia* We present new measurements of positron scattering from a series of biologically relevant molecules; Uracil ($C_4H_4N_2O_2$), Tetrahydrofuran or THF (C_4H_8O) and 3-hydroxy-THF ($C_4H_8O_2$). These measurements were taken using the high resolution, low energy positron beam at the Australian National University. The energy of the magnetically confined positron beam can be tuned between 1 and 200 eV, and the energy resolution of the beam is typically 60 to 100 meV. The measurements include absolute total scattering and positronium formation cross sections and have enabled us to assemble a set of cross sections which can be used to investigate positron transport in systems which contain these molecules, or for which these molecules serve as useful analogues, such as DNA and RNA. One of the ultimate aims of this work is to combine state-of-the-art measurements of positron