Three Ideas for low-energy e+

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Three Ideas for low-energy e+ experiments

1) Axial form factor cont'd

- **Axial form factor proposal is using electrons e- p → n ν with bkg suppression**
- **How about e+ n → p ν, by deploying e+ d → p p ν with spectator proton and two (charged) protons in the final state?**
- **Possible configuration:**
  PEPPo-2 + deuterated polyethylene target → solenoid + TPC (+ photon veto)

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2) Positron (and electron) stopping power measurements:

- **Implementation of dE/dx in Geant4 etc. based on parametrizations of 1980's database; low-energy EM physics in Geant4 not so accurate**
- **Electrons: dE/dx bigger / range is shorter, due to attraction by ions and enhanced bremsstrahlung losses in the field of ions, no Bragg peak**
- **Positrons: less bremsstrahlung, Bragg peak**
- **Layered calorimetry for dE/dx and range for 0-10 MeV e+ (and e-)**
- **Correlate e+ range data 0-10 MeV with annihilation position from PET**
- **Potential application of radiation therapy with positron beams**

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3) Positron annihilation DM search

- **A' production, e+ e- → gamma A', at low energy 0-10 MeV**
- **Scan ultra-low A' mass region (1 keV to 1 MeV), using HPGe + charged veto**
- **Sensitive to visible and invisible A'**

THANK YOU!