Influence of magnetic non-adiabaticity on a solid-Ne-moderated positron beam energy distributions.\textsuperscript{1} S. GHOSH, J. R. DANIELSON, C. M. SURKO, University of California, San Diego — High quality, trap-based positron beams typically operate in the regime in which particle transport is adiabatic. In this regime, the quantity \( \frac{E_{\perp}}{B} \) is a so-called adiabatic invariant (AI), where \( E_{\perp} \) is the energy in cyclotron motion in the direction perpendicular to magnetic field \( B \). Adiabaticity requires the parameter \( \gamma = \frac{2\pi v_{||} d|B|}{\omega_{c} |B|} \) to be \( << 1 \), where \( \omega_{c} \) is the cyclotron frequency and \( v_{||} \) is the parallel positron velocity. For beam transport energies \( \leq 30 \text{eV} \), invariance holds quite well for our trap-based beam from the buffer gas trap (BGT) to the test-gas cell. However, for larger transport energies, breaking of AI is observed at both ends of the beam tube between solid-Ne moderator and BGT, due to low \( B \) and strong field gradients. This influences the parallel \( (E_{||}) \) and perpendicular energy \( (E_{\perp}) \) beam distributions, while keeping the total energy conserved. Experimental results for a fixed source magnetic field show increases in perpendicular energy \( (E_{\perp}) \) with increased moderator bias in the range 50 – 80V (i.e., where \( \gamma \gtrsim 1 \)). Implications of this observation for BGT-based beam systems will be discussed.

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