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Electromagnet Design for an Experimental Search for CP Violation in Positronium Decay[1] RYAN PETERSBURG, REYCO HENNING, CHELSEA BARTRAM, Univ of NC - Chapel Hill — The 3-photon decay of spin-aligned triplet positronium could be used to search for a charge conjugation and parity (CP) symmetry violation. This CP violation would manifest as a nonzero angular correlation $(\vec{S}\cdot\vec{k_1})(\vec{S}\cdot\vec{k_1}\times\vec{k_2})$ between the three decay photons' momentum vectors $(|\vec{k_1}| > |\vec{k_2}| > |\vec{k_3}|)$ and the triplet positronium spin $(\vec{S})$. Current limits on this correlation are at the $\sim 10^{-3}$ level; therefore, we propose an experiment to improve this limit. In our experiment, the positronium is spin-polarized by a uniform magnetic field from a conventional electromagnet, and the photons are detected by a segmented NaI gamma detector array with large angular acceptance. This talk discusses the design of this unique electromagnet, which requires good field uniformity for the positronium source and a novel yoke design to minimize fringe field effects for the NaI array's PMTs.

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