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Determination of the Ps-He Momentum-transfer Cross-section Using Time Resolve Doppler Broadening
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This experiment uses Doppler broadening to analyze the thermalization of Positronium (Ps) in Helium gas in order to calculate the momentum-transfer cross-section of Ps. There is wide variation in previous experimental and theoretical results and so this experiment seeks to improve the measurement of this value. Tracking the thermalization of Ps atoms contained within a He gas chamber, Doppler Broadening is used to determine the average energy of Ps with respect to time. From the analysis of this energy as a function of time we can fit the data with a theoretical thermalization model and from this model determine the cross-section of Ps on He. Our work this summer has yielded a value for this cross-section, including work done to determine the corresponding error bars.