[UB04.01] Commissioning of the PIBETA Detector at PSI

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We describe details of the design, construction and performance of the PIBETA detector newly completed at the Paul Scherrer Institute (PSI). Its purpose is a precise measurement of the $\pi^+\rightarrow\pi^0e^+\nu_e$ branching ratio. The heart of the detector is a $3\pi$ spherical calorimeter consisting of 240 pure CsI crystals. The commissioning data were taken during a six week run in the summer of 1998. We present the response of the individual detector components measured at five different $\pi^+$ stopping rates between $0.3\times10^5$ and $8\times10^5 \text{ } \pi^+/\text{s}$. We also discuss the suitability of the detector for studying other rare processes, such as $\pi^+\rightarrow e^+\nu\gamma$, $\pi^+\rightarrow e^+\nu e^+e^-$, $\mu^+\rightarrow e^+\nu\nu\gamma$, and $\mu^+\rightarrow e^+\nu\nu e^+e^-$.  

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