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Muon lifetime measurement with the FAST detector at PSI

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The Fibre Active Scintillator Target (FAST) experiment at the Paul Scherrer Institute is designed to measure the μ^+ lifetime to 4 ps precision and thereby to determine the Fermi coupling constant, G_F , to 1 ppm. In FAST, a π^+ beam is stopped inside a highly granular target which images the entire $\pi^+ \rightarrow \mu^+ \rightarrow e^+$ decay chain. To achieve the high statistics required, the detector has a modular structure which allows simultaneous measurements of several decay chains. The concept of the FAST detector provides strong intrinsic suppression of potential systematic effects and allows operation at high beam rates. In 2008 and 2009, FAST collected a total statistics of 4.2×10^{11} identified μ^+ decays, allowing a statistical precision of 1.2 ppm on G_F . The analysis of these data will be presented.

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