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## Precision measurement of the positive muon lifetime by the MuLan collaboration

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The Fermi constant  $G_{\rm F}$  governs the rates of all weak interaction processes and, along with the fine structure constant  $\alpha$  and the Z-boson mass  $M_Z$ , it is one of the principal input parameters to the Standard Model. Owing to the purely leptonic nature of the muon decay process,  $G_{\rm F}$  is extracted most precisely from measurements of the muon lifetime  $\tau_{\mu}$ . In 1999, the publication of missing radiative corrections effectively eliminated the largest, purely theoretical uncertainty in extracting  $G_{\rm F}$  from  $\tau_{\mu}$ . At present, the precision in  $G_{\rm F}$  is limited by experimental uncertainty in  $\tau_{\mu}$ . We report a measurement of the positive muon lifetime to a precision of one part-per-million, a better than twenty-fold improvement over the previoius generation of experiments. The new result will improve precision in  $G_F$  to better than 0.8 parts-per-million. The MuLan experiment was conducted at the Paul Scherrer Institute in Villigen, Switzerland, using a pulsed surface muon beam, in-vacuum muon-stopping targets, and a large acceptance, finely segmented scintillator array. We will describe our measurement method and report our final result.

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