

A pixelated Scintillator Positron Timing Counter with SiPM readout for the MEG Experiment Upgrade

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The MEG experiment recently improved the upper limit on the Branching Ratio of the $\mu \rightarrow e\gamma$ decay to $BR < 5.7 \times 10^{-13}$. Now we are upgrading the MEG experiment with the goal of one order of magnitude improvement of the sensitivity by improving the detector resolution and increasing its efficiency.

An improved resolution in positron time measurement will result in a reduced combinatorial background. To this goal, we are developing a pixelated timing counter composed of many small plastic scintillator pixels with SiPM readout.

By using positron impact times averaged over multiple pixels, a good overall resolution in positron timing is expected.

We obtain single pixel resolution of 50-55 ps. Combining this result with a full Monte-Carlo simulation, an ultimate positron time resolution of 35 ps is expected.

In addition, due to its finer segmentation, this new timing counter can reduce ambiguity on hit position, and the effects of pileup.

Single pixel R&D is almost complete and a beam test has just been performed.

The status and prospects of the R&D studies on the new timing counter are presented.

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