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Harnessing the Purcell Effect for Faster Metascintillators

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Recent advancements in scintillation detection and imaging have focused on two emerging concepts: metascintillators and nanophotonic scintillators. Metascintillators leverage an energy-sharing approach with at least two scintillator components: one with high stopping power and another with fast response characteristics. Conversely, nanophotonic scintillators integrate scintillating materials into nanophotonic structures to either enhance emission rates (Purcell-enhanced scintillators) or control the flow of emitted light toward detectors. Building upon these innovations, we propose integrating nanophotonic scintillators into metascintillator designs to enhance the performance of first-generation metascintillators, thus presenting a viable technological pathway toward achieving the 10 ps CTR limit in PET imaging.

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