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The RADiCAL Platform: A Modular Development Testbed for Fast-Timing Calorimetry and Beyond

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The next generation of collider experiments will require electromagnetic calorimetry with unprecedented precision in both timing and energy resolution, alongside robust radiation hardness. The RADiCAL (RADiation-hard Innovative CALorimeter) prototype has been developed to address these challenges, thus far achieving sub-20 ps timing performance and excellent EM energy resolution in recent beam tests.

While conceived as a calorimeter module, RADiCAL is now evolving into a flexible development platform. Its modular design enables integration and evaluation of new ideas in front-end electronics, photodetectors, fast-timing readout, scintillators, and radiation-hard crystals, providing a unifying testbed where multiple R&D directions can converge. This approach positions RADiCAL not only as a pathfinder for future collider calorimetry, but also as an infrastructure to accelerate community-driven detector innovation.

At CPAD, we will present our plans to expand RADiCAL as a shared platform: advancing underlying calorimeter technology while offering an adaptable environment for the broader community to explore novel concepts in timing, materials, and readout. This inclusive framework strengthens the synergy between calorimetry (RDC 9 and DRD6-CALO) and fast-timing detector development (RDC 11), and others (DRD4-Photosensors), ensuring that critical R&D efforts are integrated, validated, and scalable toward future collider applications.

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