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MONOLITH - picosecond time stamping capabilities in fully monolithic highly granular silicon pixel detectors.

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The MONOLITH ERC Advanced project aims at producing a monolithic silicon pixel ASIC with 50 µm pixel pitch and picosecond-level time stamping. The two main ingredients are low noise, fast SiGe BiCMOS electronics and a novel sensor concept, the Picosecond Avalanche Detector (PicoAD). The PicoAD uses a patented multi-PN junction to engineer the electric field and produce continuous gain layer deep in the sensor volume. The result is an ultra-fast current signal with low intrinsic jitter in a full fill factor and highly granular monolithic detector. Proof-of-concept prototype with gain layer has already shown full efficiency with 17ps time resolution. Latest testbeam measurement of a second prototype without gain layer but improved front-end electronics have also shown full efficiency and a time resolution of 20ps averaged on the pixel surface.

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