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## Timing Resolution Measurements on Ultra-fast Silicon Detectors

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Timing Resolution Measurements  
of Ultra-Fast Silicon Detectors vs. Temperature, Fluence, Thickness  
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We report on the performance of UFSD (Ultra-Fast Silicon Detectors) from two vendors CNM (LGAD thickness 45 $\mu$ m) and HPK (LGAD thickness 50 and 80 $\mu$ m). UFSD are segmented thin silicon sensors with internal gain.

We will report measurements pre-rad and post-rad with neutron fluences between 1e14 and 6e15 n/cm<sup>2</sup> of: the leakage current, gain, time jitter, time resolution and the value of Landau fluctuations. The pre-rad measurements were performed at three temperatures (+20 deg C, 0 deg C, -20 deg C) and the post-rad measurements at -20 deg C and -30 deg C.

A few of the findings:

- LGAD with higher initial doping concentration in the gain layer achieve post-rad higher gain and better time resolution.
- An advantage of using thinner LGAD is the reduced contribution of the Landau Fluctuation to the time resolution.
- A decrease of gain due to irradiation is partially compensated by a decrease in the rise time.

Potential applications of UFSD will be discussed.

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**Session Classification:** Session11

**Track Classification:** New ideas and future applications