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# Effect of Al2O3 passivation layer in irradiated n-on-p strip sensors [Thursday]

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The significant advantages of detectors manufactured on p-type silicon material over n-type detectors in the HEP particle tracking applications
have been well documented in the R&D community. In AC-coupled p-type position-sensitive strip detectors, however, the fixed oxide
charge in the silicon dioxide is positive and, thus, causes electron accumulation at the Si/SiO2 interface. Thus, the n-type strips
become short-circuited without additional isolation implantations. The higher processing complexity resulting from this requirement can be avoided
by the use of aluminum oxide (Al2O3, alumina) thin-film insulator, grown by Atomic Layer Deposition (ALD) method. The negative oxide
charge in ALD-oxide provides strip isolation without any additional isolation structures. Measurement and TCAD simulation study of a MOS test
structure with alumina layer show a considerable accumulation of negative oxide charge in ALD-oxide after Co-60 gamma-ray irradiations. Also
a comparative study of the simulated surface properties between alumina, p-stop and p-spray sensors will be presented. Furthermore, measurements
of 2e15 neq/cm2 proton irradiated p-type MCz-Si strip sensors with alumina thin-film insulator are compared to the simulations of corresponding
sensor design as well as with conventional isolation structures.

## Summary

The effect of Al2O3 passivation layer in n-on-p strip detectors irradiated by protons up to 2e15 neq/cm2 was studied both by measurements
and TCAD simulations. The accumulation of negative oxide charge in ALD-oxide was verified by Co-60 gamma-ray irradiations.

**Authors:** HAERKOENEN, Jasu (Helsinki Institute of Physics (FI)); PELTOLA, Timo Hannu Tapani (Helsinki Institute of Physics (FI))

**Presenter:** PELTOLA, Timo Hannu Tapani (Helsinki Institute of Physics (FI))

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