

Silicon strip tracking detector development and prototyping for the Phase-2 Upgrade of the ATLAS experiment Susanne Kuehn on behalf of the ATLAS Collaboration

Introduction

- For ~2024 upgrade of LHC to HL-LHC planned with increase in luminosity (x7)
- Physics aim with 3000 fb⁻¹: measure Higgs boson properties and extend mass reach for new physics
- → Replacement of inner detector required to keep performance (high granularity and radiation hardness)
- \rightarrow R&D for prototyping and layouting of new silicon strip tracker (TDR in 2016)

The new inner tracker: pixel and strip silicon detector





ID = 94



MINISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND H

Prototyping of the new silicon strip tracker

Albert-Ludwigs-Universität Freiburg

Electrical test result of module for forward region



noise of lower module (first layout) in test frame (@150V ~3.5µA 20°C)

- About ~70 barrel and ~40 endcap good prototype modules produced
- Full-size staves with ASICs (version 1: binary CMOS 250 nm) built and successfully tested
- N-in-p strip sensors with ~300 µm thickness baseline, withstand doses of 2*10¹⁵ Neq/cm²
- → Protoyping achieving maturity in various fields

Barrel stave with 13 modules using DC-DC powering, ~1.3 m long



Prototyping towards full-size objects and with ASICs (version 2: binary CMOS 130 nm)



tools for assembly



sketch of inner most module for forward region and first hybrid

BURG

NNI



→ Many developments towards full-size objects and mass production ongoing

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Susanne Kuehn - Upgrade of the silicon strip tracker of the ATLAS experiment