LHC UPGRADE DETECTOR DEMO PROPOSAL

Juha Kalliopuska

Business from technology

OUTLINE

- Estimates for the upgrade: ATLAS & CMS
- Status of detector technologies
- Detector Demonstarot
- Discussion

ATLAS

Phase 1 (pixels, ~0,3 m^2)
- 3D or thin planar pixels
- Thickness <200 um

Pixels (~5 m^2)
- 3D (1&2) or thin planar pixels
- Thickness <200 um

Short strips (~60 m^2)
- Thin planar short strips
- Thickness ~250 um

Long strips (~100 m^2)
- Planar long strips
- Thickness ~250 um

CMS

Phase 1 (pixels, ~2 m^2)
- Thin planar pixels
- Thickness <200 um

Pixels (2-4 m^2)
- 3D (1&2) or thin planar pixels
- Thickness <200 um

Short strips (40-60 m^2)
- Thin planar short strips
- Thickness <200 um

Long strips (110-190 m^2)
- Planar long strips
- Thickness <300 um

Status of the state-of-the-art

- Existing ATLAS-3D collaboration for 3D and full 3D edgeless detector demos
  - ~10 m^2 of silicon
  - Research facilities, 100 or 150 mm wafers
  - Aim at inner tracker upgrade
- Existing long strip demonstrators from Hamamatsu on 150 mm wafers with 300 um thickness
  - 200-300 m^2 of silicon
  - Industry, 150 or 200 mm wafers
  - Aim at long strip upgrade
- Lack of technology in thin (<200 um) short strip detector fabrication, ROCs and hybridization
  - 100-120 m^2 of silicon
  - Research facilities and technology transfer to industry
  - 100 and 150 mm wafers

Detector demonstrator

- Fill the missing gap in the upgrade technologies
- Thin detector fabrication on 100 mm and 150 m wafers
  - Low cost -> no support wafer possibility
  - Edge of the wafer assumed to be critical for wafer breaking
  - Trials for thickness of 150 um and 200 um on 100 mm on 150 mm wafers, respectively
- Possible technology transfer to industry
- Successful demonstrator will promote Silicon Sensor Alliance as a whole
- Achieves competitive edge over Hamamatsu also in long strip detector deal

VTT creates business from technology