The IBL project

- Insertable B-layer, inserted in May 2014 in ATLAS
- IBL is sitting at 33mm from the beam line
- 14 staves, full azimuthal hermeticity
- 32 FE-I4 readout chips per stave
- pixel size 50 × 250 μm²
- 2 silicon sensor technology
- Planar technology, n-in-n type
- 3D technology, n-in-p type
- 2 producers: FBK and CNM
- High Radiation tolerance
- IBL will improve tracking and tagging performance
- IBL is ready for the second run of ATLAS data-taking starting in June 2015
- A list of major issues encountered during IBL construction and their solution are listed here.

Actions taken
- The solder flux was replaced with a glycerin as new tacking media.
- The new flip chip method solved the issue.
- Defects observed: open bumps and merged bumps
- The source of the defects was identified in the solder flux used during bump bonding procedure
- Cleaning and re-bondings of all the affected staves (all the ones that went through the thermal cycle procedure).
- Review of the quality assurance setups and stop of the stave production when the staves were not assembled properly.
- The stave production was stopped until a complete thermal cycle responsible of the condensation.
- Condensation during the thermal cycles of the staves.
- Climate chamber was flushed with dry air, but due to a PVC handling frame the stave temperature was slightly lower than dew point temperature.

Leakage current measurement for CNM modules

The issue
- For CNM sensors the leakage current scan was performed biasing the guard ring structure that surrounds the pixelated area.
- This test was used as a selection criteria.
- During module assembly several CNM modules showed a low breakdown voltage and they had to be rejected.

Actions taken
- Leakage current measurement was reviewed and compared to the usual procedure.
- At this stage, all the sensors that were not assembled were re-tested on a probe station.

Wire-bonds corrosion

- A corrosion phenomenon was observed on wire bonds during stave production.
- A saline powder was found on the wire bond footages.
- Condensation during the thermal cycles of the staves.
- Climate chamber was flushed with dry air, but due to a PVC handling frame the stave temperature was slightly lower than dew point temperature.

Actions taken
- The stave production was stopped until a complete understanding of the issue.
- Review of the quality assurance setups and stop of the thermal cycle responsible of the condensation.
- Cleaning and re-bondings of all the affected staves (all the ones that went through the thermal cycle procedure).
- Systematic pull test on the wire bonds.

Wire bonds oscillation in magnetic field

- The IBL detector operates in the 2 T B-field.
- The AC current passing through the wire bonds can cause oscillation of the wires.
- Oscillation can damage and break the wires.

Actions taken
- The resonant frequency has been measured as well as its effect on wire-bonds as a function of the amplitude of the AC current.
- A Fixed Frequency Trigger Veto (FFTV) has been implemented in the data-taking chain for excluding the potentially dangerous frequencies.