LHC Experiment Radiation Monitoring (RADMON)

Radiation Monitoring in the LHC experiments .. why ?
- Radiations = danger for detectors and electronics;
- Detectors lose performance over time;
- Compare the efficiency of shielding with simulations;
- Long-term background monitoring;
- Feedback on machine conditions, etc..

Passive and/or active monitors needed!

Optically Stimulated Luminescence materials (OSLs)
- INSTANTANEOUS RAD. DOSE MEASUREMENT -

(1) e^-/h+ pair generation and trapping;
(2) Infrared stimulation (800-1300 nm);
(3) Visible emission (500-700 nm) \propto Dose.

DEVELOPMENT OF SENSITIVE MATERIALS
- Thermal neutrons (Boron Doping)
- Photons and charged particles
- Fast neutrons (PE mixture)

ON-LINE REMOTE READOUT APPROACHES
- Space Applications (OSL sandwiched)
- LHC experiments (OSL deposition on dice)

RADiation-sensitive Field Effect Transistors (RADFETs)
- MEASUREMENTS OF THE INTEGRATED RAD. DOSE -

(1) e^-/h+ pair generation;
(2) e^-/h+ pair recombination;
(3) hole transport;
(4) hole trapping;
(5) Build-up of Interface

Passive Dosimeters
- MEASUREMENTS OF THE INTEGRATED P. FLUENCE -

Different types to cover a wide dose range:
- Small sizes;
- Have to be removed for readout;
- Particle and energy dependent response!!

CERN Physics Department TA1 – SD Solid State Detectors