A simulation tool for a Silicon Photomultiplier coupled to a scintillating fiber

Geometry and physics processes

**Geant 4 based simulation:**
- Minimum ionizing electrons from Sr90
- optical surface tuning
- accurate simulation of the multi-clad fiber
- accurate simulation of the SiPM geometry

**Modulation of the light collected at the end of the fiber**

- N ph at the end of the fiber
- N ph on the SiPM active area
- N ph producing avalanche
- N pixel fired

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Simulation of the SiPM response

Method description:
1. The single pixel signal is produced with a probability given by the quantum efficiency (~35% divided by the fill factor) times the discharge probability (almost 1).
2. Non-uniform single pixel gain obtain by data
3. A crosstalk signal is generated in the near pixels with a probability of 1%.
4. Pixel saturation effect is taken into account assuming a time recovery of 15 ns
5. Dark current pulses are randomly generated on the SiPM surface
6. After pulse probability ~0