CNGS Radiation Test Campaign 2009 – TE-MPE-CP phase 2

- Report on MicroFip™ problems
  - Field-bus coupler type DQAMGS (new QPS layer)
    - Using latest MicroFip™ and FIELDRIVE™ (line driver) version
    - Data are still readable but no longer updated
      - Problem could be caused by both components
    - Power cycle (triggered via an old MicroFip™ version!) re-establishes communication correctly

Event	Date and time	Dose [Gy]	Fluence [10^9 ncm-2]
1	2009-06-21 02:29:40.870	0.179	7.7
2	2009-06-22 17:44:48.070	0.017	0.8
3	2009-06-23 23:44:38.470	0.110	4.7
4	2009-06-25 05:29:55.270	0.088	3.8
5	2009-06-28 18:29:57.670	0.329	14.2
6	2009-06-30 07:44:54.070	0.077	3.3
7		**0.80**	**34.5**

- Estimates:
  - ~9 events /Gy device → 9 events /year device in LHC arc → 4050 events / year (450 devices in LHC arcs) → 20 events / day (assuming 200 days operation with beam) → not acceptable
- Possible workarounds:
  - Option 1: firmware upgrade to detect loss of communication in the field
    - Re-initialization of chip and hard reset of line driver via MicroFip™
    - No modification of field-bus coupler hardware
  - Option 2: hard reset of MicroFip™ via microcontroller
    - Minor modification of field-bus coupler hardware
  - Option 3: power cycle of MicroFip™ triggered by microcontroller
    - More complex but still feasible hardware modification
  - Option 1 and 2 to be tested in CNGS
- Future developments:
  - Software compatible radiation tolerant replacement of MicroFip™ and FIELDRIVE™ needed