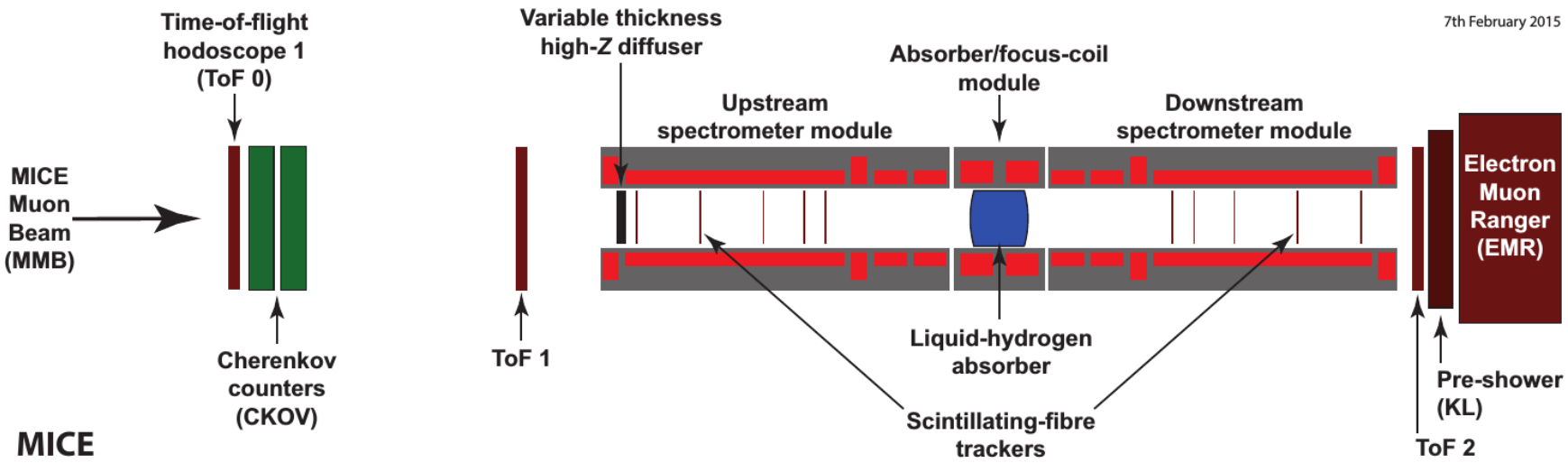
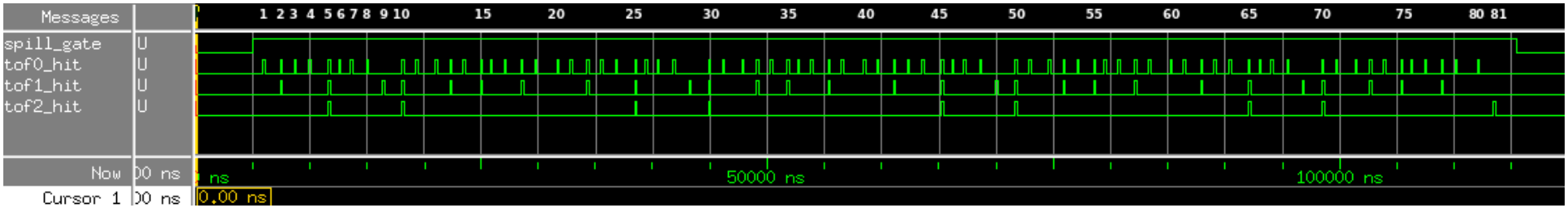
Prescaled Trigger for MICE

Aimed to measure the particle transmission efficiency of the MICE Cooling channel



A trigger can be generated by TOF0, TOF1 or TOF2.

Prescaled Trigger for MICE



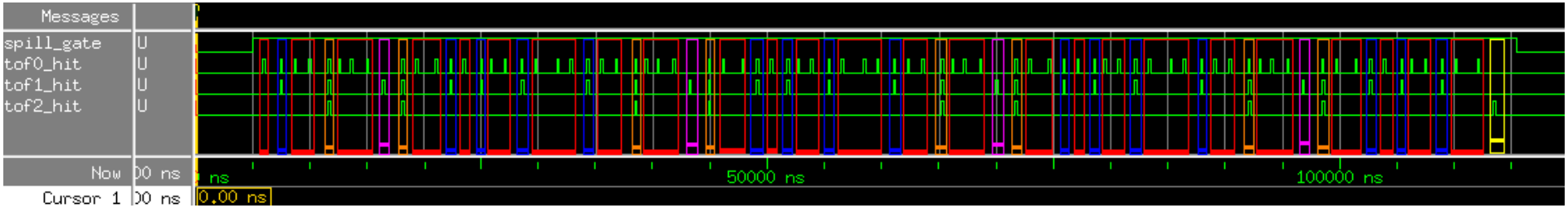
Trigger logic simulation

In this example:

The simulated spill includes 81 events of different types.

Different configurations of the logic will be tested against this input (always the same)

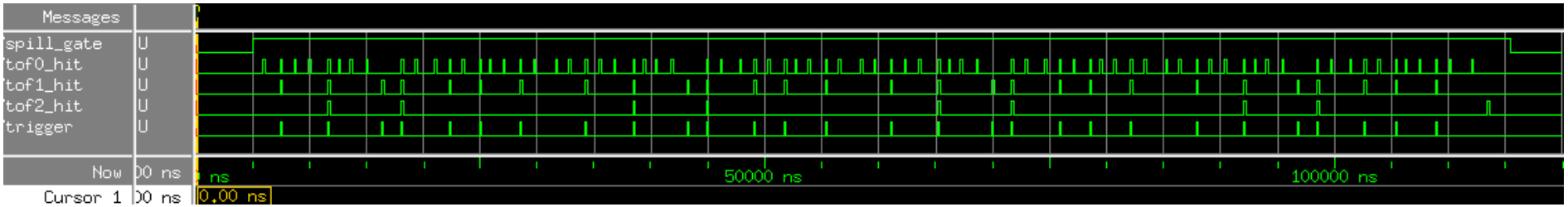
Input of the simulation



Breakdown of the input events:

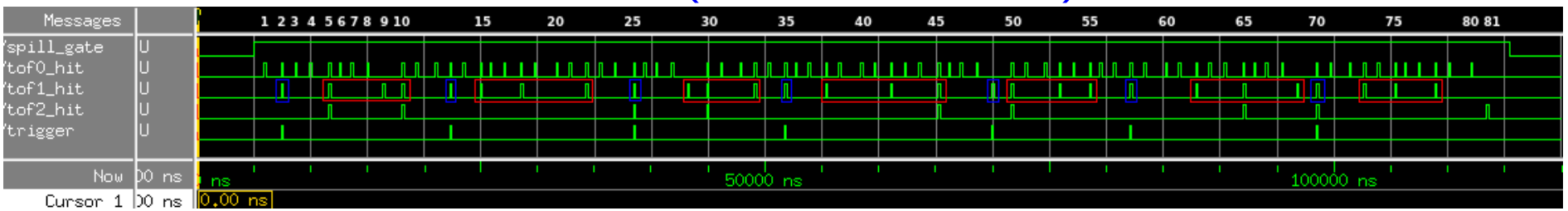
- TOF0 only - 52 event.
- TOF0 and TOF1 - 16 event.
- TOF0, TOF1 and TOF2 - 8 event.
- TOF1 only - 4 event.
- TOF2 only - 1 event.

*TOF*1 Trigger (the most simple case)



28 Particle triggers.

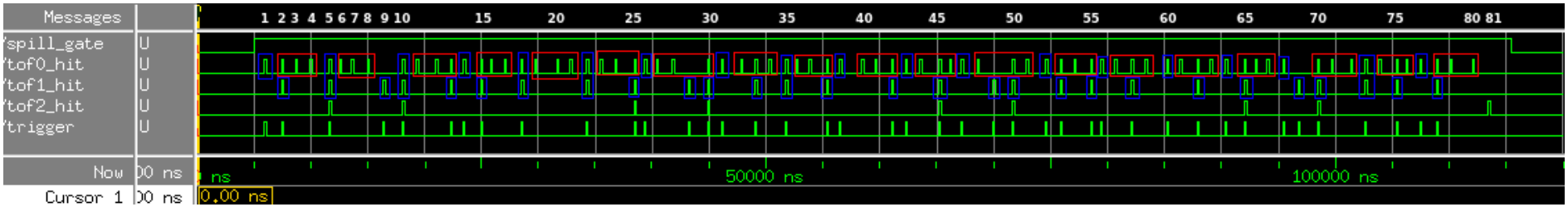
*TOF*1 Trigger Prescaled (scale factor 4)



- Events, being filtered by the prescaler.
- Events, being considered by the trigger logic.

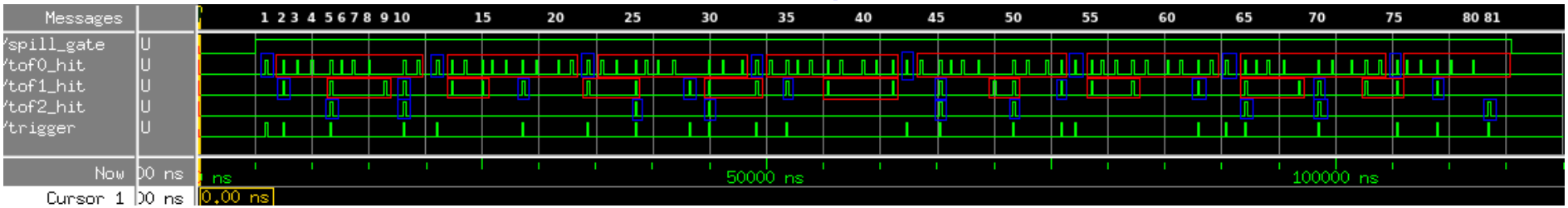
7 Particle triggers. But be careful - when you measure 7 Prescaled Particle triggers, this does not mean that the real number of triggers is 28 (25, 26 or 27 will do the same).

*TOF*0 OR *TOF*1 Prescaled (*TOF*0 scale factor 4)



41 Particle triggers.

*TOF*0 OR *TOF*1 OR *TOF*2 Prescaled (*TOF*0 scale factor 10, *TOF*1 scale factor 3)



24 Particle triggers.

Conclusion

- A new version of the Trigger firmware which includes prescalers has been developed.
- The new firmware is fully simulated and debugged and can be installed in MLCR at any time.
- No modification of the hardware is required for the moment.
- Nevertheless the new prescaled trigger logic will introduce additional level of complexity in the reconstruction of the raw data, therefore this modification has to be well motivated.