How beam driven operations optimize ALICE efficiency and safety

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The ALICE DCS is responsible for the coordination and monitor of the various detectors and of central systems, for collecting and managing alarms, data and commands. Furthermore, it's the central tool to monitor and verify the beam status with a special attention to safety.
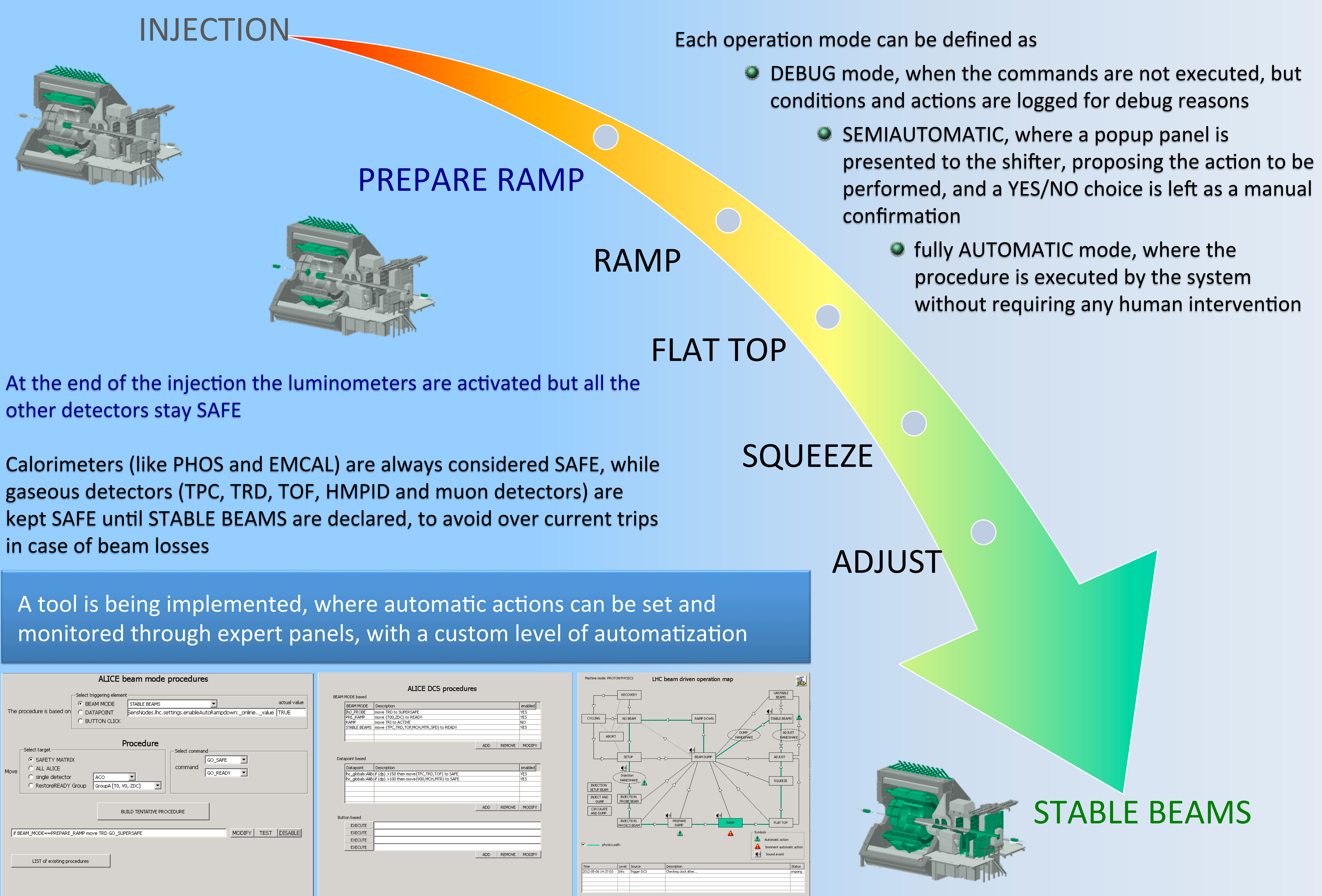
Thanks to its central role, it's the ideal system where automatic actions can be implemented, that were normally left to the initiative of the shift leader.

The ALICE DCS is a large PVSS distributed system, designed to monitor and operate the detectors through the FSM logic. The daily experience shows that nowadays, DCS routine operations are more and more often timed by beam modes and conditions.

A new abstract layer has then been introduced, based on the concept of BEAM SAFE, to overcome the FSM logic strictness and help the shifter performing the actions in due time, hiding the unavoidable complexity due to many different detector technologies.

When the LHC opens the INJECTION HANDSHAKE, announcing an imminent injection, the ALICE experiment moves to a safety state called simply SAFE; all the detectors are in a similarly called SAFE state, custom for every detector

In order to simplify routine operations, reduce human mistakes and optimize the DCS efficiency, a set of beam driven operations has been programmed, using PVSS panels and scripts, and is currently under test

Each operation mode can be defined as

- DEBUG mode, when the commands are not executed, but conditions and actions are logged for debug reasons
  - SEMIAUTOMATIC, where a popup panel is presented to the shifter, proposing the action to be performed, and a YES/NO choice is left as a manual confirmation
    - fully AUTOMATIC mode, where the procedure is executed by the system without requiring any human intervention

INJECTION

PREPARE RAMP

RAMP

FLAT TOP

SQUEEZE

ADJUST

STABLE BEAMS

At the end of the injection the luminometers are activated but all the other detectors stay SAFE

Calorimeters (like PHOS and EMCAL) are always considered SAFE, while gaseous detectors (TPC, TRD, TOF, HMPID and muon detectors) are kept SAFE until STABLE BEAMS are declared, to avoid over current trips in case of beam losses

A tool is being implemented, where automatic actions can be set and monitored through expert panels, with a custom level of automatization

Automatization of routine operations will optimize ALICE efficiency by moving detectors READY, and guarantee the detector's safety by moving them SAFE, upon the relevant beam modes and conditions, and handshakes

As soon as the STABLE BEAMS condition is declared, ALICE is promptly sent to READY, and the data taking can start, if the background conditions allow

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