Radiation monitoring system
Overview of the modifications during LS2 in Experimental Areas
13th EACM Meeting

Guillaume Michet (CERN)
HSE/RP/IL
Outline

1 Current status (ARCON, RAMSES, GRAMS)

2 New RP Monitoring System (CROME)

3 ARCON2CROME Replacement for LS2
   (locations, timeline overview, activities, current status, NA timeline)

4 Concluding remarks
Current status (RAMSES, ARCON, GRAMS)

CERN Radiation and Environmental monitoring system

CERN Radiacn and Environmenal monitoring system
Current status in secondary EA (ARCON, RAMSES)

<table>
<thead>
<tr>
<th>Area</th>
<th>Connected channel</th>
<th>ARCON</th>
<th>RAMSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Area</td>
<td></td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>EHN1</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>EHN1 Ext</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>EHN2</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>Total by system</strong></td>
<td></td>
<td>53</td>
<td></td>
</tr>
<tr>
<td><strong>Total for secondary EA</strong></td>
<td></td>
<td>53</td>
<td></td>
</tr>
</tbody>
</table>

*Removed

RP ARCON Monitor

RP RAMSES Monitors
New RP Monitoring System (CROME)

Fully CERN in-house development

Uninterruptible Power Supply

Radiation Monitor 1

Radiation Monitor 2

Alarm Unit 1

Alarm Unit 2

Alarm Unit N

Interlocks

Power Supply

Loop Detection

Unlimited number of Alarms Units is supported

Supervision

RAMS* Analysis

Maintenance plan

*Reliability Availability Maintenability & Safety

https://crome.web.cern.ch
CROME - Wall mounting version

Redundancy capabilities at the system level

TCP/IP

CUPS
Uninterruptible Power supply

220 Vac (Baco)

Hardened Field Bus (RS485 + GND-OPEN)

Alarm Unit

Alarm Unit 1

Alarm Unit 2

Interlocks

Loop Detection
Unlimited number of Alarms Units is supported

Power Supply

Courtesy H. Boukabache (EDMS 1814581)

https://crome.web.cern.ch
CROME - Rack version

https://crome.web.cern.ch

TCP/IP

220 Vac

SPA6 cable

Alarm units

Electronic Cabinet

Courtesy H. Boukabache (EDMS 1814581)
ARCON2CROME Replacement in EHN1 & 2

### Channel

<table>
<thead>
<tr>
<th>Area</th>
<th>ARCON</th>
<th>CROME</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHN1</td>
<td>36*</td>
<td>46</td>
</tr>
<tr>
<td>EHN1 Ext</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHN2</td>
<td>5*</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total by system**

|               | 41*  | 51    |

*Removed*
RAMSES and ARCON replacement timeline

- **LS1**
  - Splice consolidation
  - Button collimators
  - R2E project
- **EYETS**
- **LS2**
  - Injector upgrade
  - Cryo RF P4
  - P7 11 dip. coll.
  - Civil Eng. P1-P5
- **LS3**
  - HL-LHC installation

**LHC**
- Run 1
- Run 2
- Run 3
- Run 4 - 5...

**HL-LHC**
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2028

- 7 TeV
- 8 TeV
- 13 TeV
- 14 TeV

**Energy**
- 5 to 7 x nominal luminosity

**End ARCON**

**RAMSES PROGRAM**
- **CROME Development**
- **Repl. ARCON**
- **Replacement RAMSES RP DAs**

* DA = Saphymo Electronics

**RP monitoring system modifications in LS2 - 13th EACM Meeting**
### ARCON2CROME Replacement – LS2 Activities

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dismantling of ARCON equipment</td>
</tr>
<tr>
<td>Preparation of CROME local cables (in-lab and on-site connectors installation)</td>
</tr>
<tr>
<td>Installation of CROME Monitors, Alarm Units and Power Supplies</td>
</tr>
<tr>
<td>IT sockets declarations and channel configuration on REMUS SCADA</td>
</tr>
<tr>
<td>Commissioning tests</td>
</tr>
<tr>
<td>Observation phase, source tests</td>
</tr>
<tr>
<td>Validation tests</td>
</tr>
<tr>
<td>Update of electrical drawings and architecture design</td>
</tr>
<tr>
<td>Preventive maintenance plan and documentation</td>
</tr>
<tr>
<td>New RP system in operation</td>
</tr>
</tbody>
</table>
ARCON to CROME replacement – North Area timeline

- **2018**
  - **RUN2**
  - ARCON removal & de-cabling identification

- **2019**
  - **LS2**
  - North Area ph.1 (Alarm Units, Power Supplies)
  - CROME Equipment Readiness

- **2020**
  - North Area ph.2 (Monitors, Commissioning)

- **2021**
  - **RUN3**

**Infrastructure**
- IT/CS TN Socket installation
- EN/EL Power supply installation
- EN/EL Cable pulling installation

**CROME Observation & Acceptance period 16 weeks / Channel**

**CROME operational for beam permit...**

**North Area timeline**
- **2018**: J M J J A S O N D
- **2019**: J F M A M J J A S O N D
- **2020**: J F M A M J J A S O N D
- **2021**: J F M A M J J A

**Timeline notes**
- **CROME Equipment Readiness**
- **North Area ph.2**
- **CROME Observation & Acceptance period**
A2C replacement – North Area current status

A2C - Ethernet network installation - IT/CS
- 94% Completed
- 6% In progress

A2C - Rack installation - EN/EL
- 100% Completed

A2C - Signal cable installation - EN/EL
- 3% Completed
- 97% In progress

A2C - Power supply installation - EN/EL - SMB
- 95% Completed
- 5% In progress

A2C - Equipment installed on site - HSE/RP
- 8% Completed
- 92% In progress

A2C - Channel installed & in operation - HSE/RP
- 0% Completed
- 100% In progress
Concluding Remarks

LS2 is an important step for Radiation Protection at CERN with the introduction of CROME

As other equipment group owners, HSE/RP takes the opportunity of the LS2 to stay at the cutting-edge of RP monitoring systems

HSE/RP/IL will maintain very close contact with all relevant services

Key to success lies in careful preparation and coordination in close collaboration with support groups (EN-EL, IT-CS, Experimental Area Planning and Coordination)
Thank you for your attention