RF Reference Distribution Scheme and REFMs Details

Dominik Warsaw University of Technology
Institute of Electronic Systems
- Roughly 50 interferometers links (links for master racks only are shown here)
- Main drive line as a cascade of IMx interferometers
- IMx interferometers are redundant
- 5x interferometer links - IM0.1 (main + spare), IM0.2, MO-Lasers (main + spare)
### Injector REFMs

- **7x REFM-MO** – start of 4 main linterferometers links (+3 spare)
- **2x REFM-INJ**

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**Diagram:**

1. REF-MO
2. Interferometer IM
3. Interferometer MO-MLO
4. Interferometer IM0.2
5. Interferometer IM0.1
6. Interferometer IM0.2 (UG6)
7. Interferometer MO-MLO
8. Interferometer IM1
9. Cathode laser 1 tap point
10. Cathode laser 2 tap point
11. PLL 3.9GHz
12. Laser to RF
13. DCM
14. LOGM (main)
15. LOGM (spare)
16. GUN
17. AH1
18. REF-OPT
19. REF-OPT39

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**Key Points:**

- **7x REFM-MO**
- **2x REFM-INJ**
- **Interference:**
  - IM1
  - MO-MLO
  - IM0.2
  - IM0.1
  - IM0.2 (UG6)
  - IM1
  - MO-MLO
  - REF-MO
  - PLL 3.9GHz
  - Laser to RF
  - DCM
  - LOGM (main)
  - LOGM (spare)
  - GUN
  - AH1
  - REF-OPT
  - REF-OPT39

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**Legend:**

- **DCM**
- **LOGM**
- **GUN**
- **AH1**
- **REFM-INJ**
- **REFM-OPT**
- **PLL 3.9GHz**
- **Laser to RF**
- **DCM**
- **LOGM (main)**
- **LOGM (spare)**
- **GUN**
- **AH1**
- **REF-OPT**
- **REF-OPT39**

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**Additional Information:**

- **7x REFM-MO** – start of 4 main linterferometers links (+3 spare)
- **2x REFM-INJ**
L1 Scheme

- 2x IM1 (main + spare link)
- 2x IL1 (main + spare link)
- 6x IM2.x (3 spare links)
L1 and BC1 REFMs

- 1x REFM-L1
- 1x REFM-L2
- 1x REFM-Slave-L1
L2 Scheme

- 6x IM2.x (3 spare links)
- 2x IM.S-x
- 1x IL2
L2 REFMs

- 2x REFM-L2.1
- 1x REFM-L2.2
- 3x REFM-Slave
2x IL1 (main + spare)
1x IL2 (not redundant)
2x REFM-BC
Is the 15V power available in the EOD racks?
L3 Scheme (Stations A8, A14, A20, A26)

- 8x IM3.x (4 main + 4 spare links)
L3 REFMs (stations A8, A14, A20, A26)

- 4x REFM-L3.1
- 4x REFM-L3.4
L3 scheme (remaining stations)

- 8x IM3.x (4 main + 4 spare)
- 8x IL3.x (not redundant)
- 20x IM.S-x (3x for future upgrade at the end of L3)
L3 REFMs (remaining stations)

- 4x REFM-L3.1
- 8x REFM-L3.2 (1 for future upgrade)
- 12x REFM-L3.3 (2 for future upgrade)
- 4x REFM-L3.4
- 20x REFM-Slave (3 for future upgrade)
## REFM Designator Summary

<table>
<thead>
<tr>
<th>REFM Designator</th>
<th>Interferometer control board</th>
<th>Interferometer Tap Point</th>
<th>Link power amplifier</th>
<th>Stabilized amplifier</th>
<th>Power splitter</th>
<th>Frequency divider</th>
<th>TMCB</th>
<th>FMC for TMCB</th>
<th>FRED</th>
<th>PLL 3.9GHz</th>
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**TOTAL**

| 68 | 47 | 60 | 20 | 50 | 59 | 55 | 68 | 5 | 68 | 2 |
REFM components

- Interferometer control board - D. Kołcz
- Tap Point – D. Sikora
- Stabilized amplifier – R. Papis
- Frequency divider – simple board, not decided yet, probably P. Kownacki
- FMC for TMCB – not yet decided (D. Kołcz?)
- PLL 3.9 GHz - P. Gontarek
- Assembly - ?
Status and problems

- Interferometer control board – concept and schematics finished, PCB routing by end of May
- Redundant amplifier – design in progress. Expected in 2nd half of June.
- Detailed distribution scheme for undulators is in the design stage – must verify dates again. Several months ago installation details were not clear therefore we postponed it

- Tap Point configuration
  - Limited access to REFM components, to attenuator and phase shifter regulations (just rear panel, 2U high) – problem with tuning
  - Electronic, automatic tuning is considered now but concept still not finalized
  - Therefore rear panels are still hard to design

- Main interferometers (IMx) redundancy – main and spare cables planned for all critical links – general scheme is clear.
- Redundancy concept inside of REFM boxes not finalized (how to do it in order to improve and not to spoil reliability)
Thank you for your attention!