Elettra & FERMI
Status and developments

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Summary

**Elettra**
- new booster RF amplifier
- refurbished SCW
- Elettra 2.0
  - SSatE project
  - Multi bunch feedback upgrade
  - SYRMA – CT project

**FERMI**
- FEL02 (HGHG): first external users
- new MAGNEDYN beamline
- EEEHG scheme test

**Tango**
- Cumbia library (heir apparent to Qtango GUI)
- hdb++ progress (see hdb++ presentation)
- alarm progress (G. Scalamera contribution)
new booster RF amplifier

new 500 MHz 18 kW solid state RF amplifier for the booster
  – DVB-T technology with adaptations
  – made by SYES company
  – modular architecture
  – Tango server connects to SYES controller via SNMP protocol
  – Installed at end of 2017
  – Flawless operations since then
new booster RF amplifier
Reinstalled in 2014

- suffered a coil short circuit in 2016
- commissioned new SC magnet to BINP
- delivered in summer 2017
- improved magnet design
  - lower gap: lower current for nominal 3.5 T field
  - drastic reduction of the number and severity of quenches
- added some active quench mitigation devices
  - 1-turn stored beam dump in dangerous situations:
    - fast decay of stored beam
    - radiation detected near SCW tank
    - implemented with fast electronics and FPGA
Elettra 2.0 conceptual design report delivered (dec. 2017)
studies started in 2014: 21-st century class source, use old building

6-bend achromat design will give:
– 30 times brilliance improvement
– 33% electric power reduction

go-ahead from italian infrastructure ministry
– 155 M€ financial plan
– start of commissioning: end of 2024
Elettra 2.0 driven projects

- Elettra and Elettra 2.0 share the RF frequency and harmonic number
- We can already upgrade some plants depending on those parameters

- RF amplifier for the storage ring cavities
  - SSatE project: 4 500MHz/100 kW solid state transmitters
    - Call for tender will be issued very soon
    - Need to replace aging klystron based amplifiers

- New multibunch feedback system
  - upgrade the 15 years old system
  - project under approval by Elettra management
  - we already have some contacts with Diamond to adopt their design (collaboration with other institutes?).
Elettra 2.0 driven projects

- SYRMA -CT project

  • Upgrade the medical mammography beamline in order to be able to produce low-dose, high-resolution x-ray computer generated tomographies of the patient’s breast

  • Modularize and adapt the beamline to be installed later in Elettra2.0
Elettra 2.0

Another way to spend 155 M€... in Trieste harbour
FEL02 for external users

FEL02: uses a cascaded Harmonic Generation scheme : HGHG

After a long period of commissioning and studies a number of beam-time slots have been assigned to external users with the standard beam time assignment procedures.

new MAGNEDYN beamline

first FEL beam delivered in october 2017
ultrafast magnetodynamical studies
Echo Enabled Harmonic Generation
- novel (2009 paper) FEL generation scheme
- previously demonstrated in the UV – VUV range
- less sensitive to electron bunch imperfections:
  • narrower spectrum, more stable pulses

- tests in the soft X-rays range started in Trieste 2 weeks ago
  • modified FEL02 branch:
    – Added 2nd seed laser
    – Modified 2nd modulator (refurbished Elettra undulator)
    – Strengthened 2nd magnetic delay line
    – Lots of other interventions: vacuum, safety, diagnostics,...
  • will be dismantled later this year
HG and HGHG schema (courtesy E. Allaria)
Echo Enabled Harmonic Generation (from Dao Xiang and Gennady Stupakov
Phys. Rev. ST Accel. Beams 12, 030702 – Published 4 March 2009

![Diagram showing the process of echo enabled harmonic generation.](image)
**Tango**

**Cumbia library** – Giacomo Strangolino
- will gradually succeed to Qtango GUI library
- revised an modernized architecture
- support pluggable control systems protocols
- available on github

**Hdb++** - Graziano Scalamera
- see dedicated presentation

**Alarms** – Graziano Scalemera
- bug fixes
- store alarm history in hdb++ DB
- First tests with PANIC GUI
Thank you!