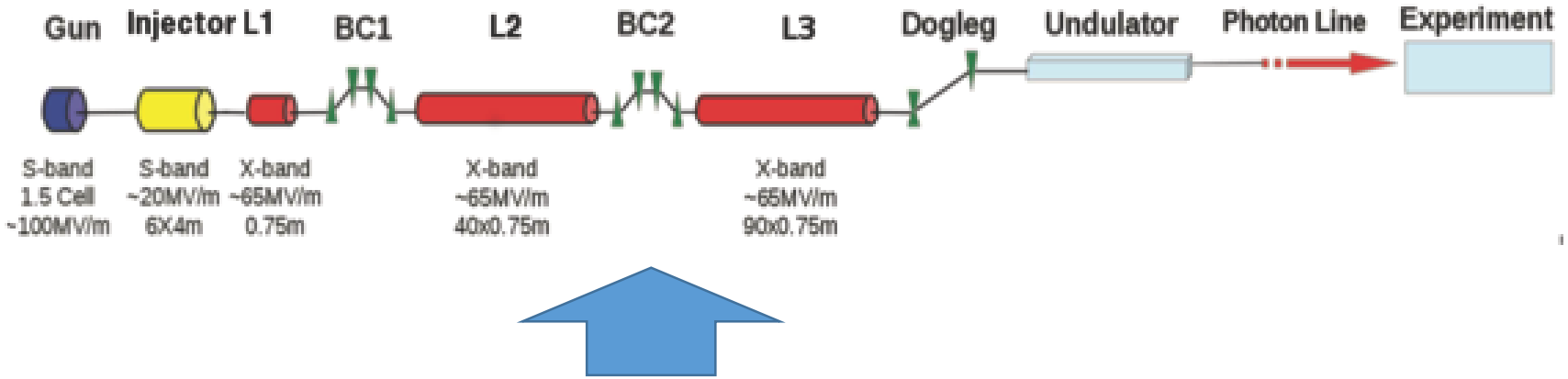
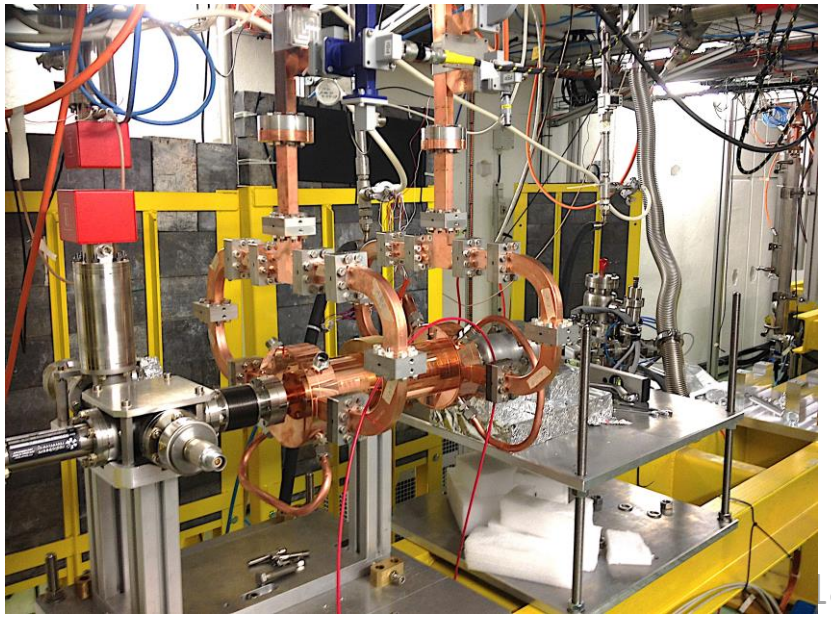
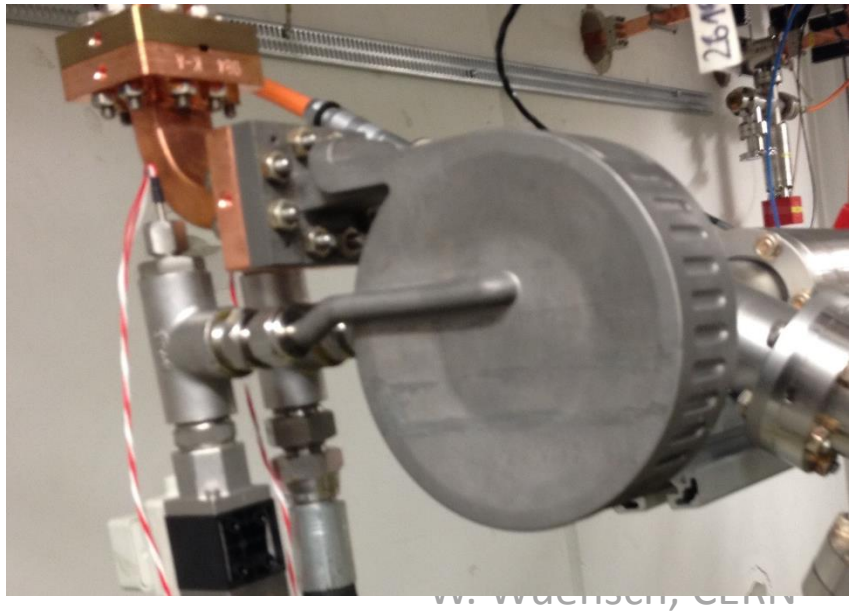
WP4 - rf system

WP4 objective: Detailed parameters, design and cost of linac rf system optimized in overall facility.







Deliverables

Deliverables (brief description and month of delivery)

D4.1 - A parameterized performance and cost model of the RF unit to be used by WP2 for the facility optimization. The model will be established in computer code and described in a report, (R, PU, M18).

D4.2 - A design report of the optimized RF unit. Based on the parameters emerging from the facility optimization, the design of the RF unit will be established at the component level and described in a report, (R, PU, M36).

D4.3 - A report on the design and fabrication procedure, optimized for series industrial production, of the accelerating structure which is an important cost driver for the facility, (R, PU, M36).

Structure and participation

Task 1: Layout and optimization of the linac rf system	Alessandro Gallo	LNF, CERN, SINAP
Task 2: Industrialization	Xander Janssen	VDL,
Task 3: Modulator technology	Marek Jacewicz	Uppsala, Strathclyde
Task 4: Power sources for higher-harmonic systems	Adrian Cross	Strathclyde,
Task 5: Integration	Markus Aicheler	Helsinki,

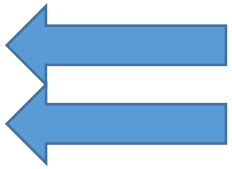
Structure

Task 1: Layout and optimization of the linac rf system
Task 2: Industrialization
Task 3: Modulator technology
Task 4: Power sources for higher-harmonic systems
Task 5: Integration

Core design effort

Structure

Task 1: Layout and optimization of the linac rf system
Task 2: Industrialization
Task 3: Modulator technology
Task 4: Power sources for higher-harmonic systems
Task 5: Integration



Specialized technology

Structure

Task 1: Layout and optimization of the linac rf system
Task 2: Industrialization
Task 3: Modulator technology
Task 4: Power sources for higher-harmonic systems
Task 5: Integration

The two “-tions” make connections to other systems and stages in project.

n.b. The integration study of Task 5 will include elements such as magnets and BPMs. The specifications will come from WP6 but we don’t currently have any dedicated experts on these systems.

Structure

Task 1: Layout and optimization of the linac rf system	
Task 2: Industrialization	
Task 3: Modulator technology	
Task 4: Power sources for higher-harmonic systems	
Task 5: Integration	

Green means work has begun. Yellow means that task will start later.
I will now present slides prepared by Tasks 2,3 and 5 on their behalf, followed by presentations by tasks 1 and 4.

Task 2: Industrialization

Deliverables:

→ Industry perspective on:
- modular design
- redesign for manufacturability, COG, maintainability
- supply chain setup and management
- system engineering and integration
- fabrication approach

→ Support Task 1, 3, 4 and 5 with manufacturability knowledge

→ Feed project with knowledge gained in projects with e.g. CERN, PSI, Smart*Light.

Planning: TBD in detail. Team up with other Task leaders during midterm meeting June 2018 Trieste to discuss. Q3/4 2018 document with general industry perspective. To be augmented with specific info for XLS project from Q1 2019 onwards.

People involved: Hans Priem, Xander Janssen, Mathieu Breukers, Ton Peijnenburg, …

Input needed from other tasks in WP4: Design choices regarding single RF parts (accelerator (disks), network, power source) and system design of repetitive accelerating structure.

WP4: Task3 - Modulator and Klystron technology

Task Outline:

- Klystrons and modulators closely related – optimization must consider both simultaneously. Only commercially available solutions
- Work with companies to convince them that further develpment to match our needs is worth their effort
- Optimization in term of:
  - RF quality (frequency- , phase- and power stability, time jitter, efficiency etc.)
  - Footprint (RF power density [MW/m^2])
  - Cost
- Feedback from companies for other Tasks in WP4

Input for the Task:

- Basic FEL parameters from users e.g.: repetition rate
- Linac optimization
  - Aperture
  - Gradient
  - Operating scenarios
- Compression scheme

Objectives:

Early objective: Market survey for available systems and components

Once the linac parameters are specify → propose design(s) for RF unit that will serve for discussion

Final objective: Design of an optimized RF unit; existing or ready for industralization

Participants:

Uppsala University: M. Jacewicz, M. Jobs, R. Ruber

WP4 RF --- Task 5: Integration

Lead: HIP

Participants: ---

Description:

Task 5 deals with Integration design as well as maintaining appropriate data for our WP. One key element will be a 3-D solid model of the rf linac unit. An initial version will be produced based on preliminary task 1 parameters and then kept up to date as the design evolves and advances.

Prerequisites:

- Length of an accelerating structure
- Some sort of lattice design and ”RF unit” layout
- Information on magnet dimensions/design

Start date foreseen 2nd half of 2018

Additional information needed along project as comes available:

- Positioning tolerances of AS
- Geometrical and thermal stability tolerances of AS
- Thermal tuning/management?