EURIZON TASK 4.1 Deliverable 4.1.1



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Extract of the document describing EURIZON tasks 4.1:

*The beam dynamics studies of the work package 4.1 aim at developing tools and concepts that can be used for the next generation light sources. Existing numerical tools based on the Accelerator Toolbox will be adapted and extended using modern algorithms to provide a framework that could be used during the design and commissioning phases of future storage ring projects or to enhance the performance of existing machines. Developments will focus on methods to improve lattice modeling strategies, perform lattice optimization and correction or simulate realistic operation conditions. The developed tools will be applied to the ESRF-EBS and the PETRA IV lattice models to validate concepts to reduce the natural horizontal emittance or improve the injection efficiency or the lifetime of storage rings. Machine dedicated time at the ESRF or DESY can be allocated for experimental validation when appropriate. Monthly meetings will be organized to follow-up on the progress and share developments.*

# Introduction

The outcome of the discussions during Milestone meetings M4.1.1, M4.1.2 and M4.1.3 has been the definition of the following list of activities

1. Magnetic cross talks among neighboring magnets in the H7BA lattice of EBS and H6BA lattice of PETRAIV.
2. MDT activities at EBS and PETRAIII for storage ring optimizations:
   1. Using extremum seeker [cite]
   2. Measurement and analysis of TbT data analysis to determine Storage ring optics
3. Definition of a new functions for errors and correction based on pyAT

The activities listed above are detailed in the sections below

## Magnetic cross talks for EBS and PETRAIV

Description of the common interest in such studies and on the impact on the SR commissioning

Description of actions taken for EBS and PETRAIV

Description of how these actions may be applied to other SR with similar lattice modelling issues

References

## MDT activities at EBS and PETRAIII for storage ring optimizations

Description of the objectives of common MDT activities.

## Lifetime optimizations using extremum seeker

Summarized description of the optimizer

Why it is a possible tool for lifetime optimization

Work done to prepare the MDT

Description of the MDT activity

Results and outlook

References

## Measurement and analysis of TbT data analysis to determine Storage ring optics

Summarized description of the TbT data analysis for optics

Why it is a possible tool for storage ring optimization

Work done to prepare the MDT

Description of the MDT activity

Results and outlook

References

## Definition of a new functions for errors and correction based on pyAT

Description about commissioning simulations

List of functions defined

Examples of output of the functions

Description of the use of such results by other laboratories

Links to repositories for code

References

## Other activities related to the Task 4.1

Description and pictures of the visits

Description and pictures of the meetings

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