

A New Toolbox for the ANKA Storage Ring

Sebastian Marsching

Laboratorium für Applikationen der Synchrotronstrahlung, Universität Karlsruhe (TH)

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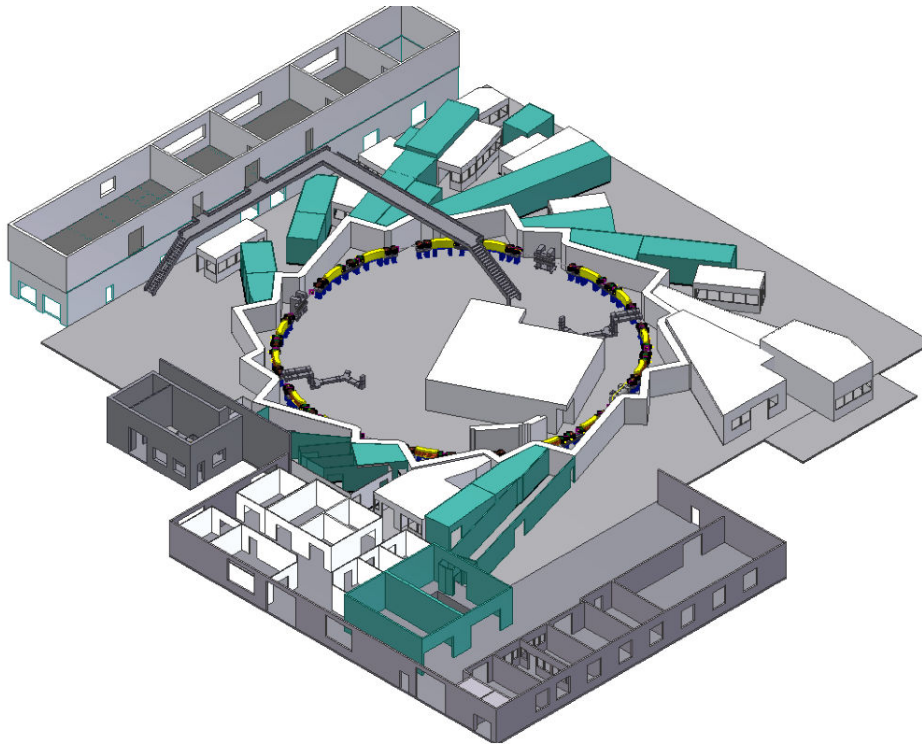


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Outline

- Introduction
- Controlling the Storage Ring with MATLAB
- Integrating Diagnostics Tools: Automating Tune Measurements
- The Future
- Summary

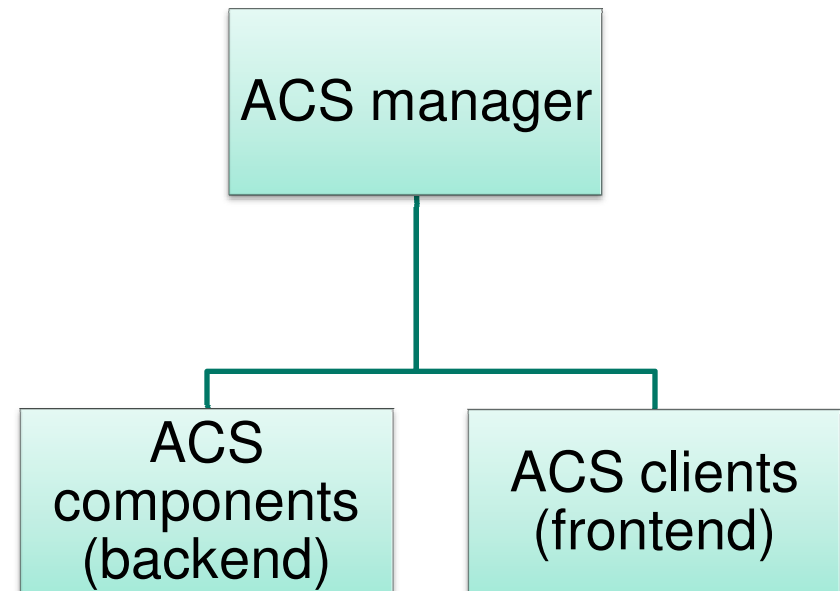
ANKA Synchrotron Radiation Source



- **Storage ring:**
 - 2.5 GeV
 - 110 m circumference
- **Low Alpha mode:**
 - 1.3 GeV
 - Coherent THz radiation

ANKA Control System

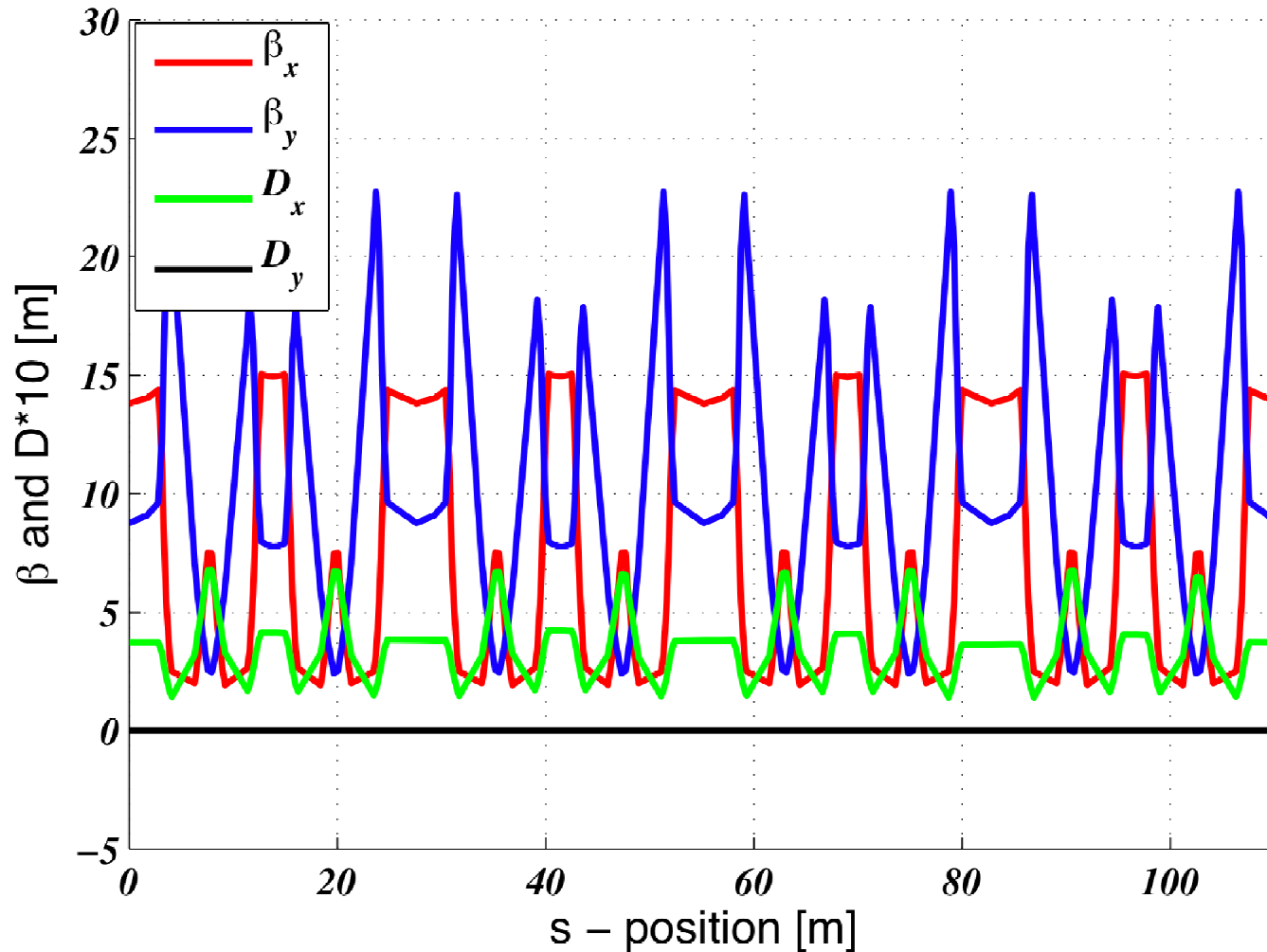
- **Based on ACS (ALMA common software)**
 - Java frontend
 - CORBA for intersystem communication
- **Backend components:**
 - Power supplies
 - BPMs
 - etc.



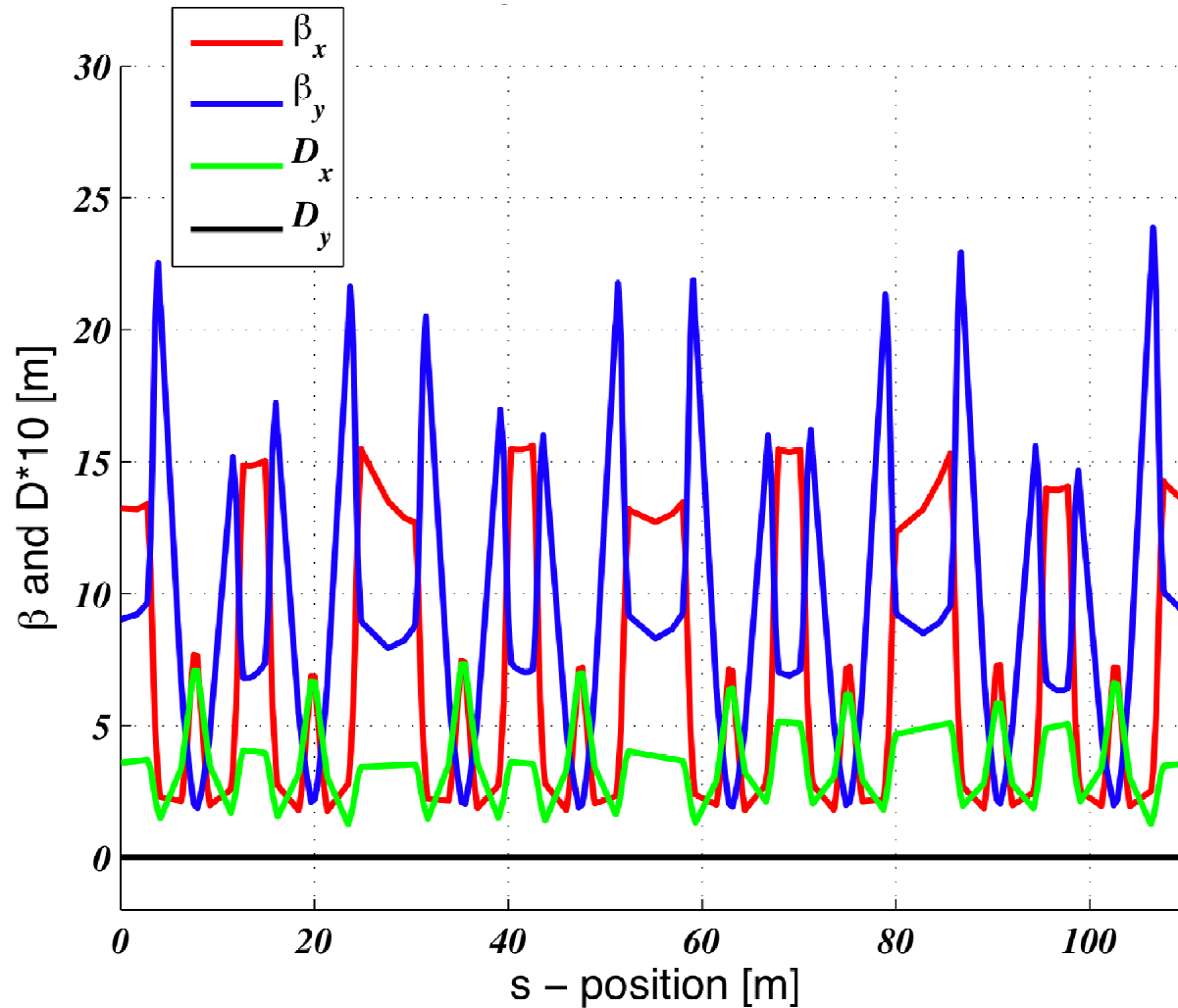
Why Connect ACS and MATLAB

- **ACS contains all information about the current state of the storage ring**
 - **Beam Position Monitors (BPMs)**
 - **Magnet currents**
 - **RF frequency**
- **MATLAB is a great tool for simulations and measurements**
 - **Accelerator Toolbox**
 - **LOCO (Linear Optics from Closed Orbits)**
- **Combining both allows for live fitting of the model to the “real” storage ring**

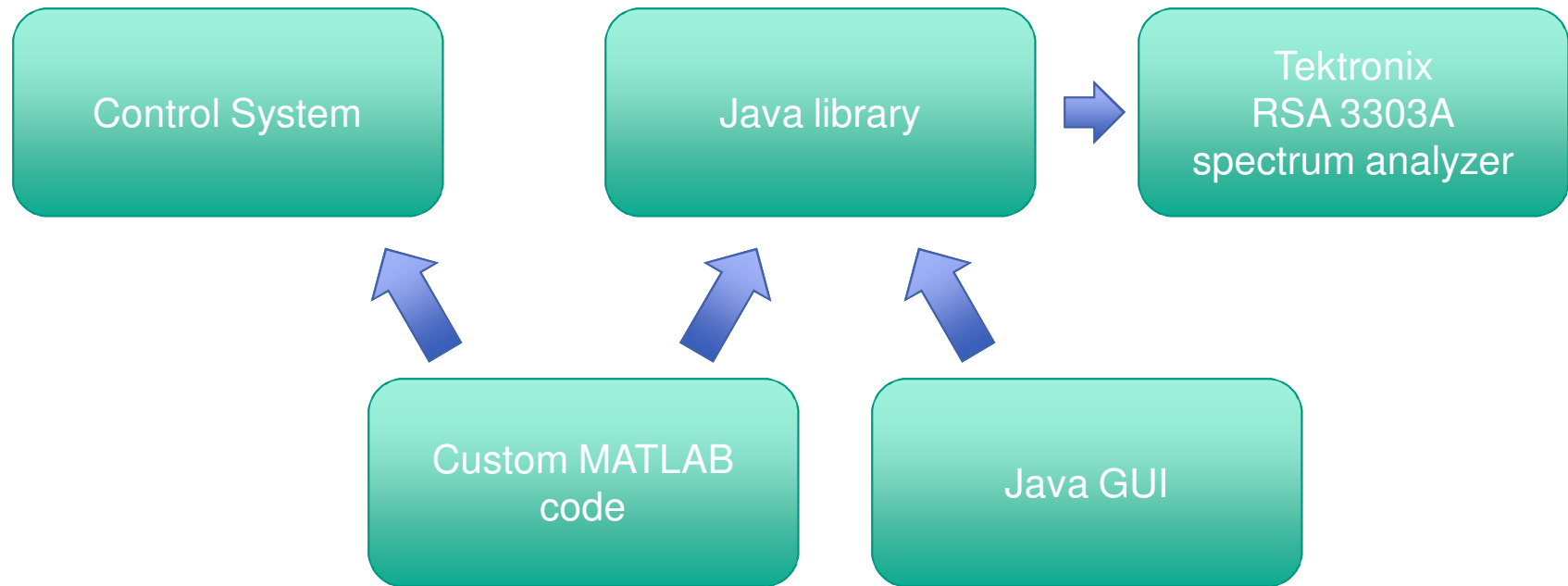
Unfitted Model Optics



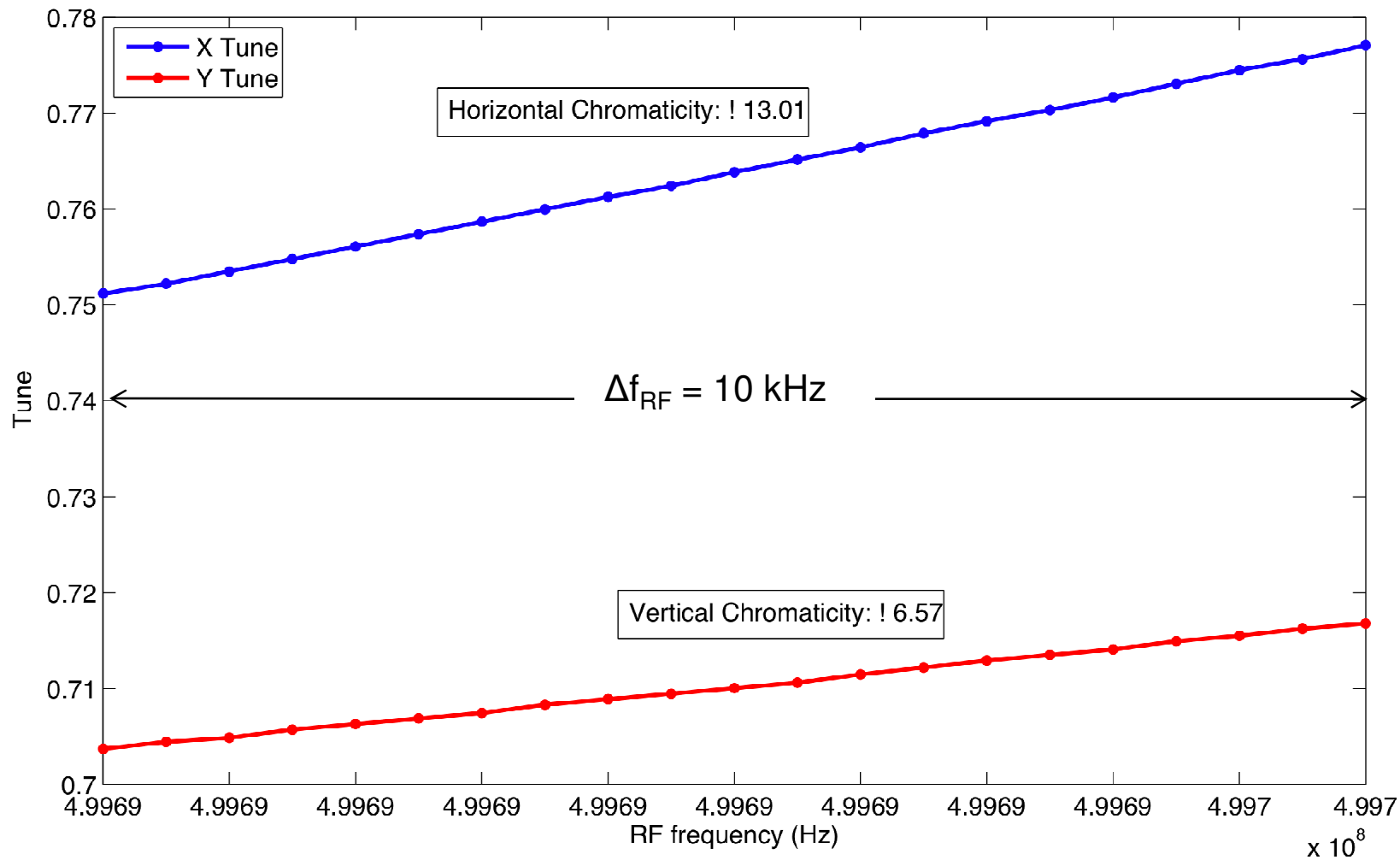
“Real” Optics



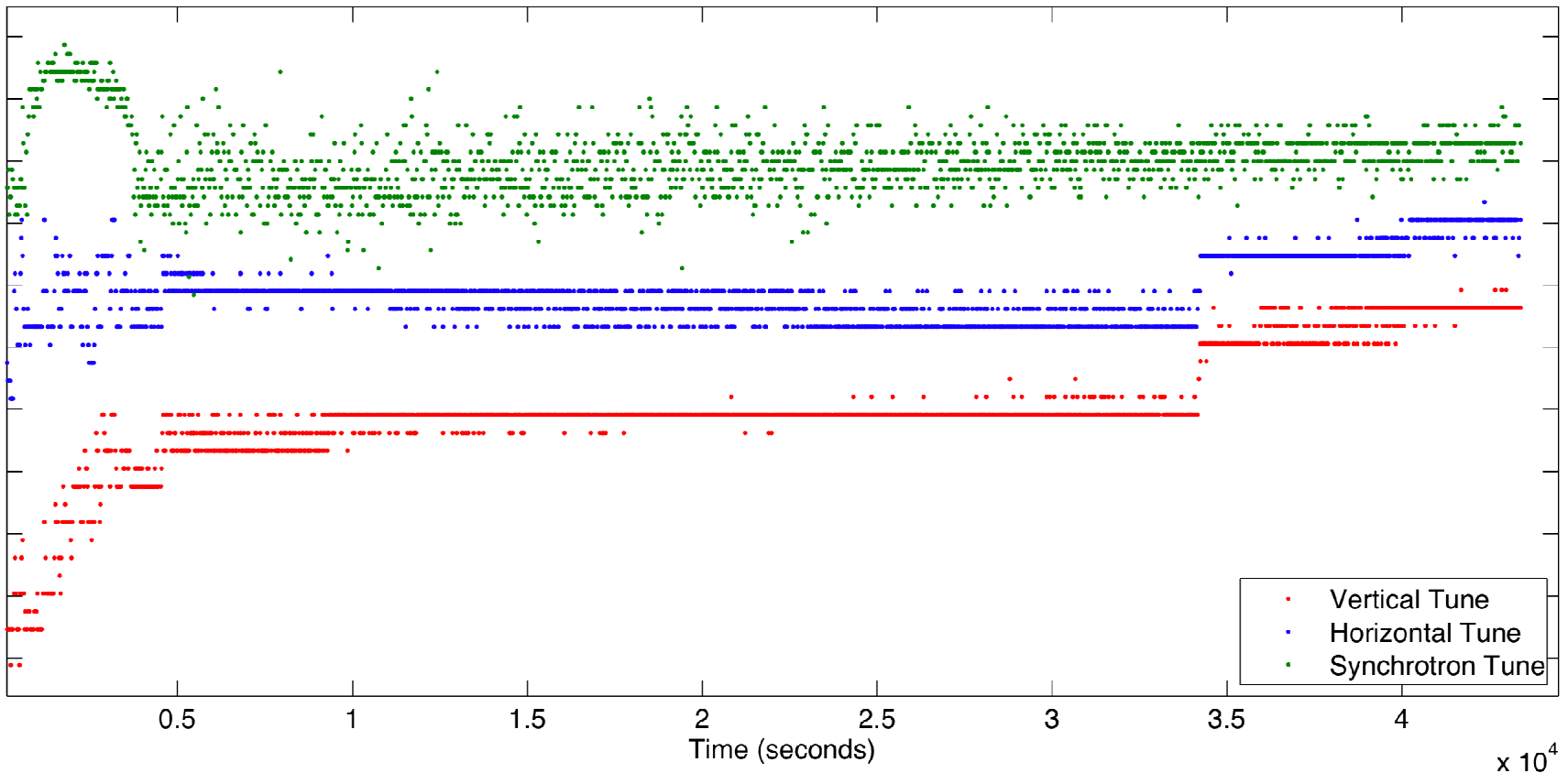
Automating Tune Measurements



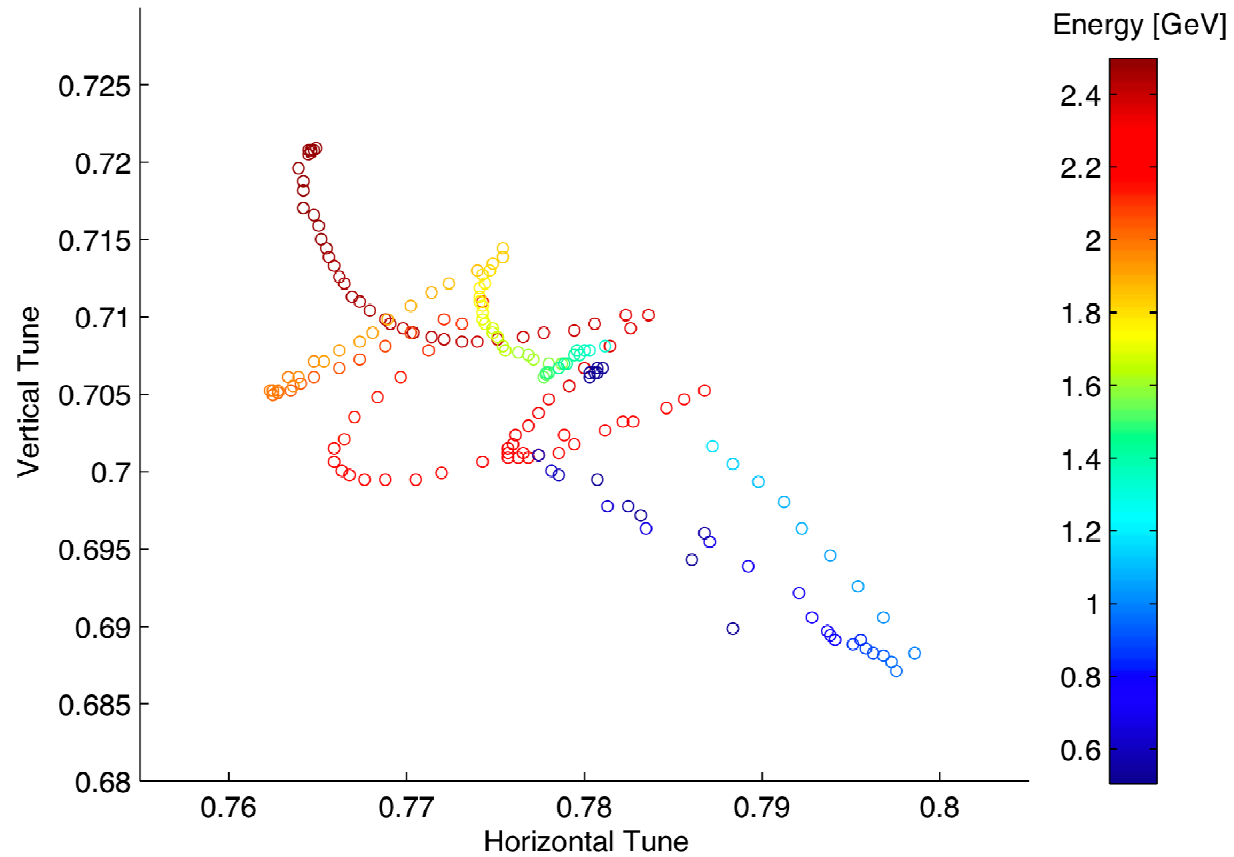
Chromaticity Measurements



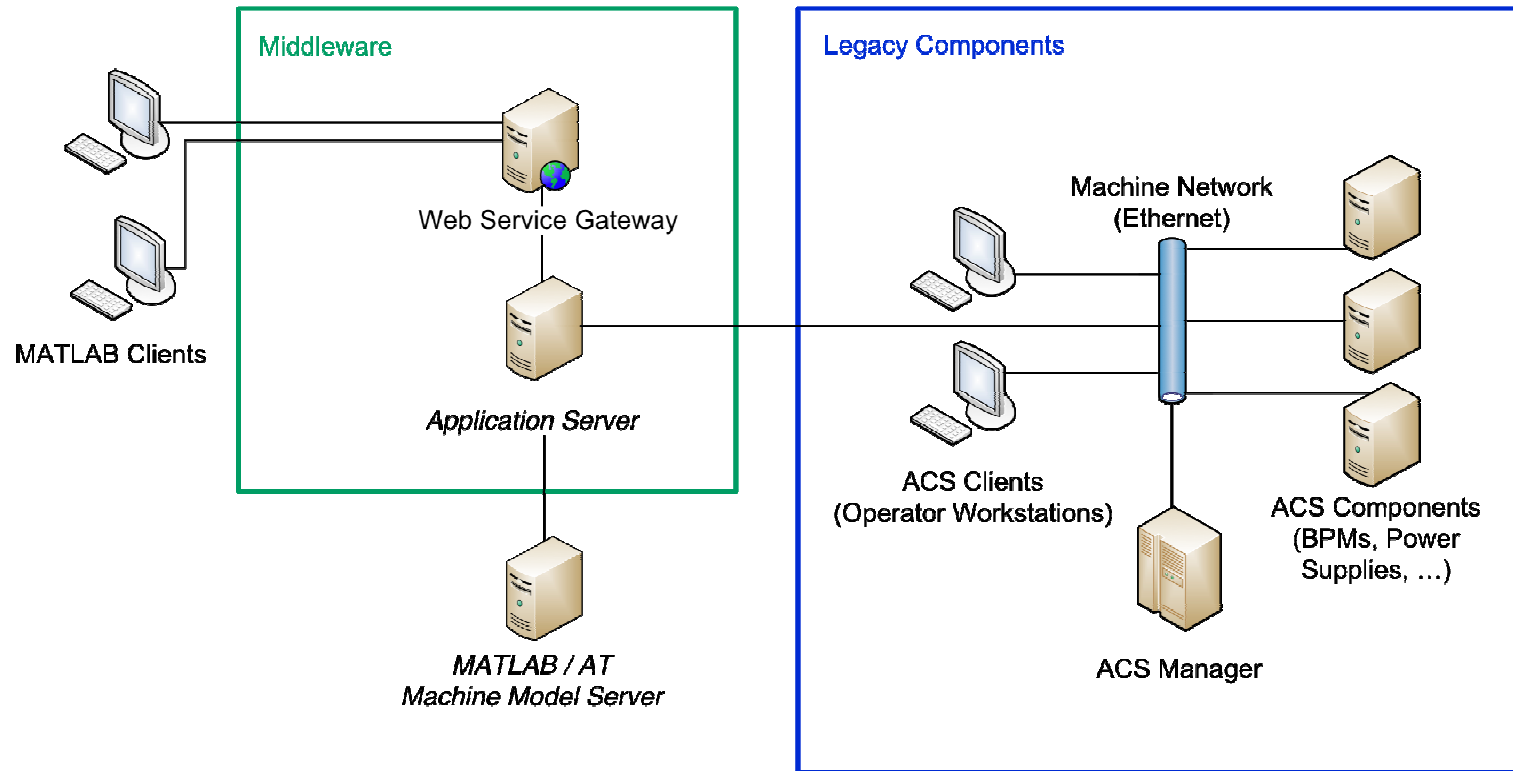
Tune Drift over Time



Tune Change in Energy Ramp



The Future: Integrated High-Level Interface to the Control System



Summary

- **A software bridge for controlling the storage ring from MATLAB has been created**
- **Tune and chromaticity measurements have been automated, thus reducing the workload on the operator / accelerator physicist**
- **A common abstraction layer, centralizing access to the machine model, the control system and diagnostic tools is planned**

Thanks to

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QUESTIONS & DISCUSSION