IPP INSTITUTE OF PLASMA PHYSICS
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Camera Tomography

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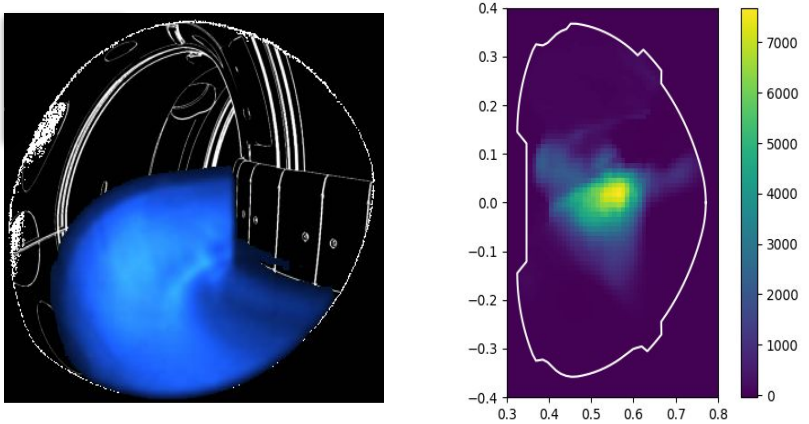
Introduction

Motivation

limited number of diagnostics for the integrated commissioning
tomography requires only images and geometry definition
support ECWC modelling by providing emission profiles

Limitations

toroidal symmetry assumption
strong reflections can deteriorate results



Tomographic inversion at COMPASS
(left: modified camera image, right: inversion result)

TOMOTOK - tomography software

Python namespace package - can be separated into fundamental part and machine specific complements

Core part

- open source (EUPL)
- multiple inversion algorithms
- tested on nakasvr17
- available at https://github.com/tomotok or https://pypi.org/project/tomotok/
- overview article https://doi.org/10.1088/1748-0221/16/12/C12015

Complements

- can be private
- flexible design

Algorithm types

Regularisation algorithms

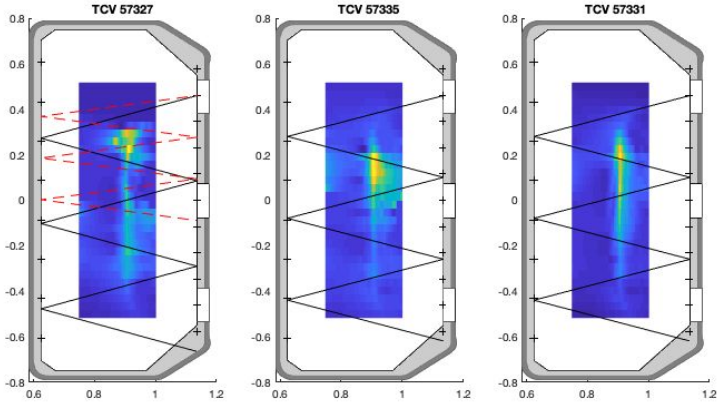
support a priori information (smoothness)
work also for underdetermined tasks
each inversion requires optimization loop

Decomposition based

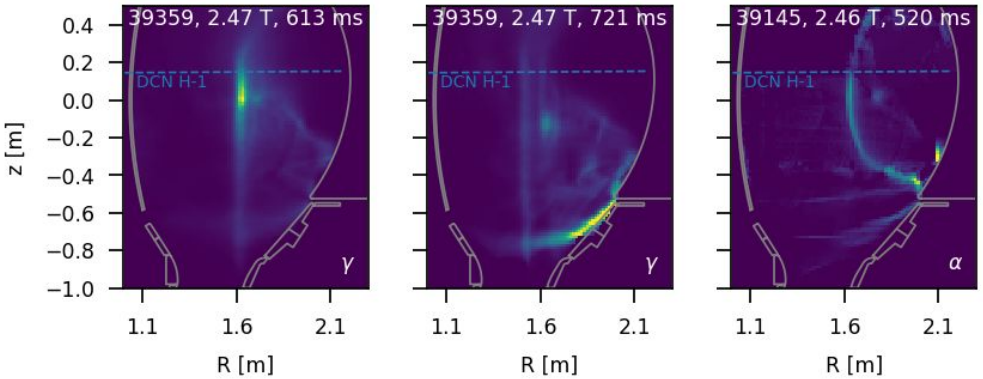
no a priori information
requires well determined tasks
after decomposition only matrix multiplication

Previous experience

Analysing ECWC experiments conducted in WPTE at TCV and AUG
Collaboration with T.Wauters, J. Buermans, R. Ragona, E. Huett…



reconstructions of ECWC plasma at TCV with EC wave path overlaid



reconstructions of ECWC plasma at AUG using filtered camera images (Balmer alpha and gamma lines)

Summary

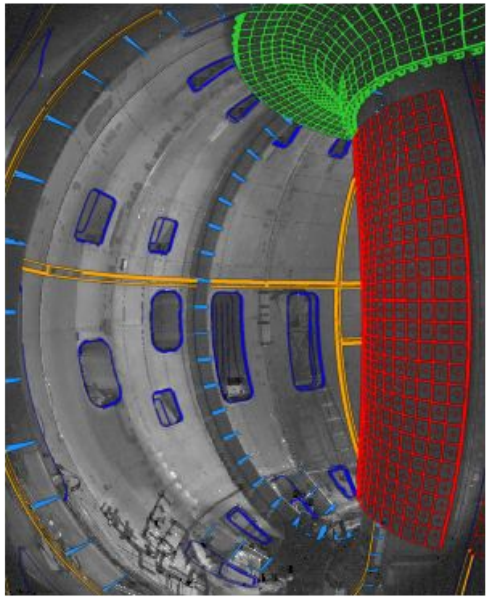
Work done

Spatial calibration
using Calcam software and vessel image
https://euratom-software.github.io/calcam/html/index.html

Installation on Naka servers
software installed on Nakasvr for a single user
inversions algorithms tested on artificial data

Work planned

apply to JT-60SA data
resolve edicam raw data access
investigate feasibility for RE (CM deliverable)



Calcam output after edicam calibration.
Colored lines are taken from CAD model