





Deep Learning for Spectrogram Analysis of Reflectometry Data

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FSD Science Coordination Meeting





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Project Team





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Motivation



Improve capabilities of conventional **reflectometry diagnostics**



Automatically extracting physically relevant features from timefrequency representations (spectrograms) of reflectometry signals

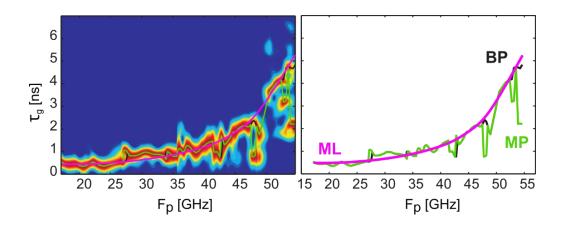


n_e - electron density profile and fluctuations

Description







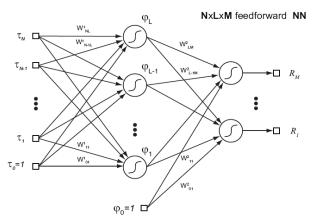
- O-mode FMCW data for n_e profile reconstruction
- Replace maximum peak (MP) or best-path (BP) algorithms using
 Machine Learning (ML) models
- Image segmentation task → Convolutional Neural Networks

Main Tasks



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- Full-wave Simulations: combine experimental data with superimposed turbulence models into REFMUL code to obtain synthetic FMCW training data replicating AUG system;
- Tool and Database Development: tools to access AUG and REFMUL data, create data structures, process data and build database;
- CNN Modelling and Validation:
 test different arquitectures of CNN
 models (e.g.region-based, fully
 convolutional) using the Tensorflow/Keras
 framework;



Timeline





Task №	Task Denomination	Participant responsible for task	Acronyms of partners involved in task	2024								2025											
				5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Project Management	JV	JV, JS																				
2	Communication and Dissemination	JV	JV, JS, FdS, XX																				
3	Full-wave Simulations	FdS	FdS, JV																				
4	Tool and Database Development	JS	JS, JV, XX																				
5	CNN Modeling and validation	JS	JS, JV, XX																				
				D1	D1 D2					D2				D4			D5	5			D6,D7		
	D3/Progress Rep								ерс	ort	t D8/Final Repor										rt		