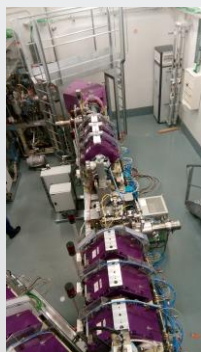


Enhanced Emittance Evaluation

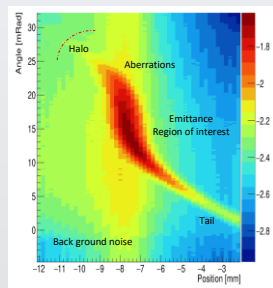
Marcel Heine, Francis Osswald

Objective: Enhanced beam quality evaluation
 Improve rms-emittance calculation and increase tail and halo detection for injection channels @ Research Infrastructures
 Application to non-Gaussian beams, non-uniform distribution, multibody structure, noisy images, and high resolution scanners



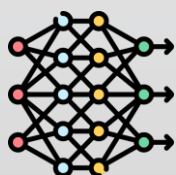
Domain

Low energy DC ion beams (injectors)
 2D/4D transverse phase space distributions
 High resolution scanning/beam sampling



Mailstones

Data cleaning (S/N filtering)
 Contour reconstruction (deconvolution)
 Data base definition (interlab)
 Training (simulations+experiments)
 Pattern recognition, beam analysis, diagnosis
 Tests, consolidation, validation
 Implementation in users network (IN2P3)



Methods

Data cleaning
 Anomaly detection
 Data generation from experiments and simulations
 Deep learning and CNN(?)
 Image recognition



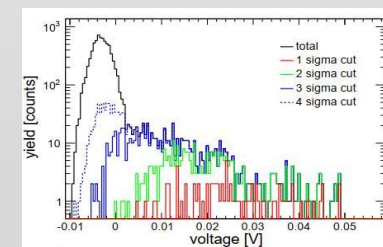
Applications

Assistance for diagnosis of RI operation
 Control of beam losses
 S/N filtering (beam diagnostics)
 Increase of technological level of industry
 Image recognition in life science



Specific aspects

Synergies with other SC and WG (1, 3, 4)
 Academic collaboration with data scientists
 Testing and validation with industry
 Knowledge transfer
 Student training



Risks

Low S/N ratio
 Experimentation (resources)
 Benchmarking (models, criteria)
 Innovation, new approach

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Process

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