**Objectives & Studies:**
- Full size ITER NBI RF ion source
- 1280 beam apertures
- H: (D) current density: 355 A/m² (285 A/m²)
- Beam energy: 100 keV
- 3 electrodes for extraction and acceleration

**Compensation systems:**
- GG aperture offsets for beamlet repulsion
- Embedded GG SmCo magnets to counteract the deflection induced by CESM-field (magnetic compensation system)
- GG alternated aperture offsets to counteract the deflection induced by CESM-field (electrostatic compensation system)

**Simulation parameters and constraints:**
- voltages and current
- beamlets repulsion
- relative position between beamlets and grids aperture
- CESM field
- interaction with the background gas (stripping)
- interaction with surrounding beamlets groups

**NIFS @ JAEA (Japan)**
- RF ion source
- 46 beam apertures
- H: current density: 100 A/m²
- Beam energy: 30 keV
- 3 electrodes for extraction and acceleration

**Objectives:**
- New extraction grid MITICA-like design for ADCM test
- ADCM Br dimensioning
- Code benchmark
- Code – experiment comparison

**Magnetic simulations**
- The source was operated with a long single pulse often lasting the entire experimental session, during which the different pulse conditions were explored.
- From H₂ spectra the rotational temperatures have been found. H₂ rotational temperature has been derived from the simulation of the rotational bands. The simulated spectra at different rotational temperatures were superimposed to the experimental data in order to find the best match.

**NIO1 experimental measurements**
- From H₂ spectra the rotational temperatures have been found. H₂ rotational temperature has been derived from the simulation of the rotational bands. The simulated spectra at different rotational temperatures were superimposed to the experimental data in order to find the best match.

**Optical Emission Spectroscopy (OES)**
- A great variety of plasma parameters from spontaneous radiation: \( T_p \), \( n_p \), \( n_{imp} \), impurities content...
- The light emitted has been observed from two viewports at 26 mm from the PG, looking one into each other (light collected from the same region). Each viewport hosts optic head (BK7 lens: φ=50 mm, φ=10 mm) conveying light into quartz optical fibers.

**Capacitive to inductive coupling transition (E-H mode transition)**

**NIO1 @ Consorzio RFX (Padova)**
- Compact 2 MHz RF negative hydrogen ion source
- 9 beam apertures on a 3x3 lattice
- H: current: 130 mA
- Acceleration voltage: 60 kV
- 3 stage acceleration + repeller electrode

**Objectives & Studies:**
- Radiofrequency coupling
- Space charge compensation
- Test of source and beam diagnostics
- Validation of codes against experiments
- Alternative uses of caesium or alternatives to caesium
- Photoneutralization processes

**Numerical and experimental characterization of beams of negative ions and improvement investigation**

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