Compact Neutral Particle Analyzer (CNPA)

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1. Objective

Neutral Particle Flux for energetic ion behavior and ion temperature, etc.

2. Instruments

2.1. Analyzer

The Compact Neutral Particle Analyzer CNPA-04 is an instrument designed to measure the fluxes of H0 atoms emitted by hot plasma in the energy range 0.82 – 168 keV. The analyzer is of conventional type with the stripping of the neutrals in thin carbon foil and with the further energy and mass analysis of secondary ions in E||B fields. It operates in two different modes (setups) providing the simultaneous measurements of the fluxes with the mass-suppression ~ 10-3:
Setup 1: H0(11.5 – 168.0 keV), UACC= 0 kV;
Setup 2: H0(0.82 – 158.0 keV), UACC = 10 kV.

- CNPA is installed at 3-O port.
- 40 energy channels from 0.8-168 keV.
- Fig. 1 shows the CNPA drawings
- neutral particles are ionized by the thin carbon film. The ions are bent by the electric and magnetic fields and reach the channeltron detectors.

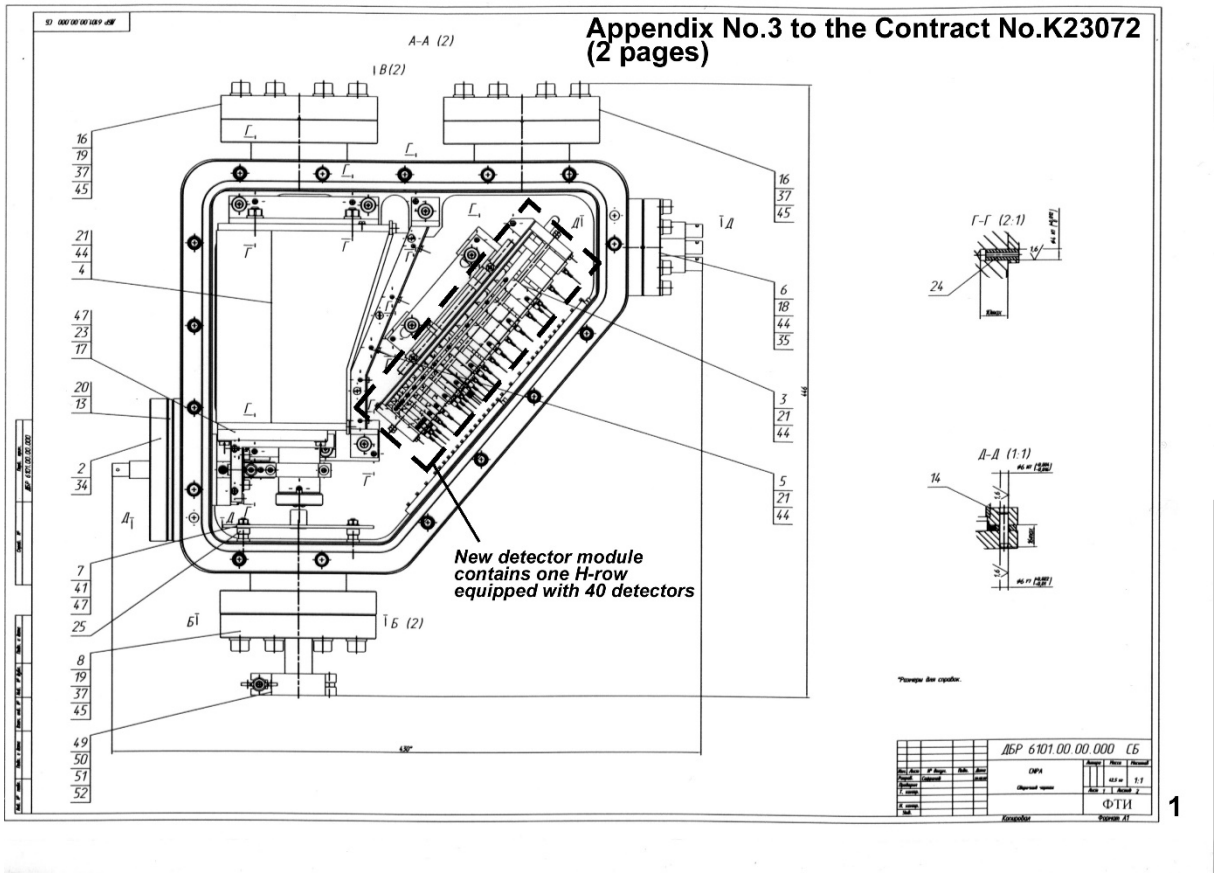

Fig. 1a. CNPA side view

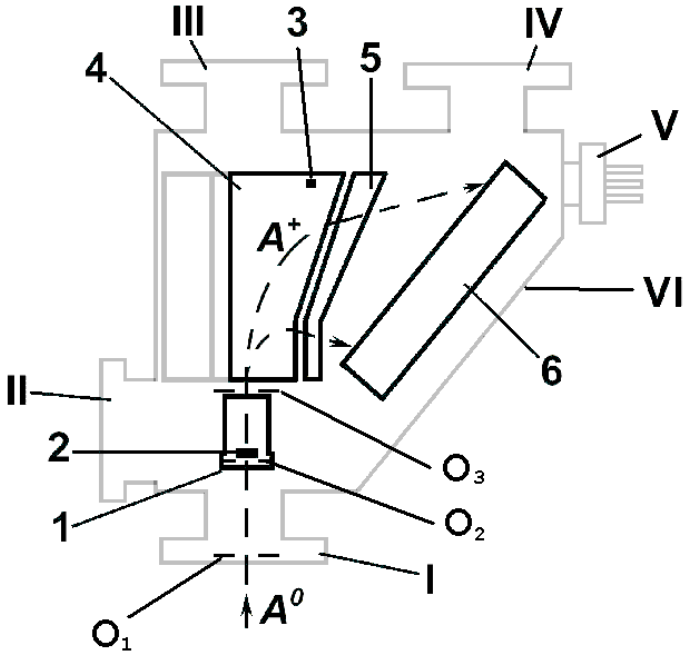

Fig. 1b. CNPA

2.2. Power Supply and cable connection

TABLE 1

PS Unit	Connector No.	Connector Type			Current	Stability
High Voltage PS for Accelerator	45	15381-01-W SHV-Grounded Shield CERAMASEAL- 10 kV (air plug 8058-02)	Positive	0–10 kV	200 μA	10^{-3}
High Voltage PS for Detector Array	48	8030-02-W SHV-Grounded Shield CERAMASEAL- 5 kV (air plug 8058-02)	Negative	3 kV	2.5 mA (for all detectors)	10^{-3}
High Voltage PS for Analyzing Electrostatic Condenser	46	15381-01-W SHV-Grounded Shield CERAMASEAL- 10 kV (air plug 8058-02)	Positive	0–10 kV (bipolar)	200 μA (each)	10^{-3}
	47	15381-01-W SHV-Grounded Shield CERAMASEAL- 10 kV (air plug 8058-02)	Negative			
Current PS for Hall Probe	41, 44	Radiall SMC R112603000	Any polarity		100 mA	10^{-3}

2.3. Data Acquisition

- CAMAC Latching Scalers with Memories. All acquisitions are automatically operated by LABCOM system.

3. Operation

3.1. Normal operation

Data are acquired each 0.1 ms at normal operation. In the long discharge, the duration will be changed.

3.2. Pellet charge exchange

Data are acquired each 0.1 ms even in Pellet charge exchange experiment. To avoid the data saturation, the current mode can be also utilized.

4. Available data by “Retrieve”

Data name is “CNPA”

References

[1] T. Ozaki, P. Goncharov, N. Tamura et al., 812 , 399, (2006), International Conference on Research and Applications of Plasmas 2005.