

$\uparrow D^-$ Charge Exchange Ionizer for the JINR Polarized Ion Source Polaris

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Abstract. An intensive study of polarization phenomena was carried out at the Dubna 4.5 GeV/nucleon Synchrophasotron, using cryogenic source of polarized deuterons ($\uparrow D^+$) POLARIS. There is a proposal to make a polarized deuteron beam in the new accelerator Nuclotron to continue the spin physics experiments. The Nuclotron has a short one-turn (8 μs) injection of positive ions at present. To increase the intensity of the accelerated polarized beam up to $0.7-1 \cdot 10^{10}$ $\uparrow D$ /pulse a multiturn charge exchange injection of negative ions (20-30 turns) should be applied. That is realized by injection into the accelerator of $\uparrow D^-$ ions and stripping them inside the ring. The atomic beam source POLARIS will be modified into $\uparrow D^-$ source. A new cryogenic charge exchange ionizer, using $\uparrow D^0 + H^- = \uparrow D^- + H^0$ reaction, is designed and manufactured. It is a liquid He cryostat with superconducting solenoid, charge exchange high voltage bore, extraction grids and 90° bending magnet. H^+ ions from plasma gun are converted into H^- ions on the molybdenum cesiated surface of the external emitter. 10 mA H^- plasma beam are measured at output of a test bench warm ionizer. It is waiting soon installation of the plasma gun into the cryostat. The setup design and plasma gun test results are described.