

**HIGHLY EFFICIENT  $H^-$  ION SOURCE FOR CYCLOTRONS WITHOUT CAESIUM**

A. V. Demyanov, A. I. Kolosov  
Institute for Nuclear Research (INR)  
Kiev, Ukraine.

An internal high current  $H^-$  ion source for cyclotrons and other injectors was developed which makes use of some very effective methods of  $H^-$  ion production. The source is distinguished by high gas efficiency. A surface-plasma method for  $H^-$  ion production without using caesium vapor was realized. A strong current arc discharge was applied for dissociation and dissociative ionization of  $H_2$  molecules. An  $H^+ \rightarrow H^-$  recharge method using a residual gas layer adjusted by thickness and pressure was realized in this source. In a double-chamber ion source with high-current discharge in the single chamber and low-current low-volt discharge in the different chamber is used the supplementary electrode which a composite-plate cover with low electronic work function ( $\sim 1,5$  eV). Anticipate of ion current of  $H^-$  is 1--2 mA.