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TWO-DIMENTIONAL HYBRID SOLID STATE GAS DETECTOR BASED ON 10B LAYER FOR THERMAL AND COLD NEUTRONS

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Two-dimensional hybrid solid state gas multiwire detector of thermal and cold neutrons [1] is created at the Institute for Nuclear Research. The detector has an active area of 128 x 128 mm2 with double gas gap of 2 mm and a 10B converter. The input window is made of a thin aluminum layer (3mm) to prevent scattering and absorption of neutrons. The operation of the detector was studied using W-Be photoneutron source. The photoneutron source (IN-LUE) was created on the base of industrial electron linac LUE-8 operating at electron energy of 7 - 8 MeV, tungsten electron-gamma convertor, photoneutron beryllium target and moderator of fast neutrons. The detector is located at a distance of 6 m from the source at an angle of 60 relative to the electron beam axis. The detector efficiency is estimated as ˜3% at neutron wavelength λ = 1.82 Å and 6% at λ = 8 Å. The efficiency of the background detection was less than 0.001% of that for thermal neutrons. The resulting pulse height resolution is 15% and the spatial resolution is 2.5 mm for the X coordinate with gas mixture Ar + 25% CO2 + 0.3% CF3Br under standard conditions. The resistive charge-division readout is applied to determine neutron position from pulse height values.

1. Litvin V.S., Potashev S.I., Razin V.I. and Sadykov R.A. Bull. Russ. Acad. Sci. 75, 229 (2011).

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