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## Position sensitive detector array for radioactive ion beam experiments

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We present an array of position sensitive detectors designed for the work with the beam of radioactive nuclei delivered by the separator ACCULINNA /1/. It is in use in the studies made on the structures of light nuclei with extreme neutron excess /2/. A pair multi wire proportional chambers (MWPC) installed in the front of a target is used for the measurement of the hit co-ordinates and inclination angles of the trajectories of individual beam nuclei entering the target. An annular type IEXXEXE charged particle telescope, intended for reaction products, makes another part of the detector array. Each MWPC has two planes of mutually perpendicular wires. Each plane is made by 32 20 µm Ta(Au) wires wound with a 1 mm step. These chambers can deal with a maximum beam intensity approaching 5\2105 pps. The two chambers working together provide for a 95 % detection efficiency for the beam nuclei of 6He and 8He. The telescope involves three annular silicon detectors and a circular array of CsI (Tl) crystals matching the geometry the Si detectors. The front Si detector involves eight separate 40 µm thick Si modules assembled to make a detector ring with inner and outer diameters of 26 and 70 mm, respectively. A 300 µm thick annular Si detector with an active area having the inner and outer diameters of 32 and 85 mm, respectively, just follows after the front detector in the telescope. This doubleside strip detector has 32 unbroken rings, on one side, and 64 sector strips on another side. The third, 1000 µm thick Si detector is similar in its active area with the second one, but it has only one set of 64 strips. The CsI(Tl) array is composed of sixteen 19 mm thick trapeziform modules in a way allowing one to cover with its sensitive area a ring having inner and outer diameters of 33 and 88 mm, respectively. The read out of the light coming from the CsI(Tl) crystals is provided by spectrometric photodiodes. The energy resolution is characterized by 50 and 150 keV full widths at half maximum obtained for 5.5 MeV  $\alpha$  peaks, respectively, with the 300 and 1000 µm Si detectors and with the CsI(Tl) crystals. By means of this telescope one can well detect and identify nuclei with atomic numbers from Z=1 to Z=6 having energy in a range from 1.5 to 70 MeV. The whole system works well in experiments where the hitting position of individual ions on the target is defined with a precision of ±0.75 mm and the emission angles of reaction products are fixed within ±1.5 mrad. Beam tests showed an overall energy resolution of 0.7 % obtained for 130 MeV 6He nuclei.

## References

1. Rodin A.M., Stepantsov S.V., Bogdanov D.D. at. al. Nucl. Inst. and Meth. in Physics Research B 204 (2003) 114-118. 2. Golovkov M.S., Grigorenko L.V., Fomichev A.S. et. al., Phys. Rev. Lett., 93 (2004) 262501.

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