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Geometry and resolution calculations of the new INS spectrometer at FLNP JINR

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The inverse-geometry inelastic neutron spectrometer NERA has already been operating for more than three decades and during that time has proven to be a very successful machine for broadband chemical spectroscopy with neutrons. To continue the research using the best modern technologies, the project of a new inverse-geometry inelastic neutron spectrometer has been started. New instrument will be located in the Frank Laboratory of Neutron Physics (JINR, Russia) at IBR-2 pulse reactor. Its parameters will significantly outdo the parameters of NERA spectrometer. With solid angle of 6 sr and resolution of the elastic line at the level of 0.55 meV the new instrument will allow to perform chemical spectroscopy with neutrons on a world-class level. Calculations of the secondary spectrometer's geometry and performance were carried out during the design phase of the project and they are presented in this work. The main concept is to place a set of HOPG analysers resembling a bell shape, on both sides of the sample position. Design and optimization of the secondary spectrometer were accomplished using Monte-Carlo ray tracing simulation software McStas and analytical methods.

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