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New mechanic and cooling systems for the silicone detectors used in high energy physics experiments

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A key role for charged particles tracking in modern high energy physics experiments, belongs to the central vertex detectors surrounding the interaction point. With these detectors, it can be possible to investigate heavy-flavour particle (registering of the particles containing c and b quarks) physics and investigate the space-time evolution of strongly interacting matter so-called quark-gluon plasma. To achieve these goals, it is important to improve the spatial resolution of primary and secondary vertices and to decrease a registration threshold for transverse momenta of charged particles. Therefore, the new pixel detectors with minimum material budget (to reduce the multiple scattering effects) and efficient mechanic and cooling systems should be used for tracking charged particles.

In the present work, the ideas, developments and studies of mechanic and cooling systems for novel vertex detectors based on silicon pixel sensors have been presented. The obtained results can be used in both high-luminosity collider experiments and for some high-technology medical applications.

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Primary author: NESTEROV, Dmitrii (St Petersburg State University (RU))

Co-authors: IGOLKIN, Serguei (St Petersburg State University (RU)); LAZAREVA, Tatiana (St Petersburg State University (RU)); Dr MALTSEV, Nicolai (Saint-Peresburg State University); PROKOFIEV, Nikita (Saint-Petersburg State University); RAKHMATULLINA, Alina (St Petersburg State University (RU)); Dr FEOFILOV, Grigori (St Petersburg State University (RU)); ZHEREBCHEVSKII, Vladimir (St Petersburg State University (RU)); MISHENEVA, Vera (Saint Petersburg State University)

Presenter: NESTEROV, Dmitrii (St Petersburg State University (RU))

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