Simulation of the location of the Earth Bow Shock by using PIC EM Relativistic code"

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Abstract: The Earth's bow shock is created by the supersonic solar wind flowing onto the geomagnetic field. The front of this shock is curved, standing around the Earth from the dayside. The bow shock is of great interest in space plasma investigation as it contains important physics ranging from kinetic to global scales. Interaction of the supersonic solar wind with Earth's magnetosphere (magnetopause) creates fast mode magnetosonic waves that travel back upstream, combine and steepen to form the bow shock wave. The distance to the bow shock is then the sum of the magnetopause distance and the magnetosheath thickness. [Merka and Szabo and references therein] It has been established been well established that the bow shock (and the magnetopause) scales with the solar wind ram pressure P_{sw}[Binsack and Vasyliunas, 1968; Formisano, 1979] . We are trying though to simulate the position of the bow shock by using a modified Tristan PIC EM Relativistic Code. By doing so, we will help the science community to use our model to better understand the shock physics in our geospace.