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P5.3003 Study of particle flow generated by 70-kV 30-ns vacuum surface flashover

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See full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/P5.3003.pdf

In this work we study plasma beams generated by 70-kV 30-ns vacuum surface flashover discharge. The aim of the work was to compare parameters of particle flows at different values of discharge current and reveal the dependence of particle flow power on current. We used a pulsed generator with coaxial glycerol-filled pulse-forming line. Maximum voltage is 70 kV, width of current first half wave is 30 ns. We used polymethyl methacrylate (PMMA), polytetrafluorethylene (PTFE) and polyethylene (PE) as samples. Also, potassium chloride (KCl) single crystals were used as model objects. We measured full energy of the plasma flow, ionic current, velocity of ions, and thrust at 2 values of discharge current (3 and 5 kA). Alteration of current was performed by the redesigning of the forming line. We obtained plasma bunches with energy up to 0.1 J for PE, PTFE and KCl at frequency of 100 pps. We show that as the discharge current increases, the ions velocity doesn't change significantly. Velocity of ion component of the plasma beam for both cases is up to 500 km/s. Meanwhile, the increase of full energy of the plasma flow is mainly due to increase in total mass of the bunch of particles. Average mass velocity of ions was calculated from values of thrust. Average velocity increased twice for PMMA and 1.5 times for KCl as the current was raised up to 5 kA.

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