Abstract Submitted
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SPACE : a relativistic, 3D Particle-in-Cell code with atomic physics support[1] PRABHAT KUMAR, Stony Brook University, KWANGMIN YU, JUN MA, Brookhaven National Laboratory, ROMAN SAMULYAK, Stony Brook University, CO2 LASER DRIVEN WAKEFIELD ACCELERATION PROGRAM AT BNL COLLABORATION — A parallel, relativistic, three-dimensional Particle-in-Cell code SPACE has been developed for the simulation of electromagnetic fields, relativistic particle beams, and plasmas. In addition to the standard PIC algorithm, SPACE includes efficient, novel algorithms to resolve atomic physics processes such as the generation and evolution of plasma, recombination, and electron attachment on dopants in dense neutral gases. SPACE also contains a highly adaptive and artifact-free particle method, called AP-Cloud, for solving the Vlasov-Poisson problems. The code's structure, capabilities, parallelization strategy and performances has been discussed. Applications of the code in modeling various processes in the eRHIC program at Brookhaven National Laboratory (BNL), high pressure RF cavity experiments at Fermilab and CO_2 laser driven wakefield accelerator experiments at BNL's Accelerator Test Facility is presented.

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