

Quarks, Gluons and Nuclear Rocket Propulsion

Dr. Redamy Pérez-Ramos

Institut Polytechnique des Sciences Avancées (IPSA), Ivry-sur-Seine;
Laboratoire de Physique Théorique et Hautes Energies (LPTHE),
UMR 7589 CNRS, Paris

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In this seminar we discuss some basics of quantum chromodynamics (QCD), the gauge theory of strong/nuclear interactions among quarks and gluons within the Standard Model of particle physics. Low energy limits of QCD leads to effective physical phenomena commonly known as fusion and fission which, for the latest, can be



applied to several fields of industry and to nuclear rocket propulsion in the near future. We show the crucial link between criticality and geometrical dimensions of a fission nuclear reactor from simple stationary solutions of the neutron diffusion equation. We present the "Nuclear Engine for Rocket Vehicle Application (NERVA)" project (1955-1973) of NASA and finally, we show that the specific impulse of a nuclear engine due to the high power input from nuclear fission and exhaust velocity can be as twice as that achievable with a chemical engine.