NOVEL ACCELERATOR CONCEPT UTILIZING CYCLOTRON RESONANCE (ECRA)

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We will present progress in our effort to design and develop a new type of compact accelerator that can help to solve some flux and energy limit challenges associated with the current generation of accelerators. This accelerator concept utilizes cyclotron resonance in a TE rotating-mode microwave cavity. In this electron Cyclotron Resonance Accelerator (eCRA), particles gyrate along axial field lines and are accelerated by the transverse RF fields generated by a TE RF cavity. In this configuration, an initially non-relativistic electron beam will become relativistic after only a few gyrations in the magnetic field and energy gains of order 10 MeV can be readily achieved for a range of applications. A key feature of the proposed accelerator configuration is that the beam remains un-bunched, in contrast to beams generated with conventional acceleration schemes using a linac or RFQ. This results in reduced space charge fields and enables acceleration of high current beams in a compact accelerating structure.