



**On “A brief history and  
review of accelerators”  
by P.J. Bryant**

K.G. Capobianco-Hogan

# History

**DC Acceleration:** higher energy particles (than available from radioisotopes) needed for nuclear experiments.

**Resonant Acceleration:** used to reach higher energies than available with DC accelerators.

**Betatron Mechanism:** time dependent B field induces E field used for acceleration, oscillations observed.

# Development

**Phase Stability:** bunch injection at correct RF phase provides longitudinal focusing.

**Weak Focusing:** slight decrease in B field as radius increases provides limited transverse focusing.

**Strong Focusing:** focusing and defocusing magnet pairs can produce net transverse focusing.

# Further Development

**Storage Ring Collider:** collide two beams for increased center-of-mass energy.

**Microtron:** all orbits pass through a common accelerating structure; revolution frequency decreases by a multiple of the accelerating structure's frequency.

**Radio-frequency quadrupole:** combine focusing (B quad) and accelerating (E) in single RF field.

**Linear Electron Colliders:** synchrotron radiation limits energies achievable in electron synchrotrons; linacs can mitigate this, but sacrifice the ability to reuse accelerating structures.

Since publication, RHIC and LHC have been constructed and SSC canceled.

# Reference

P.J. Bryant, “A brief history and review of accelerators” [\[CERN\]](#)