The Beams and Applications Seminar Series

A New Scheme of Lattice Design for Synchrotron Accelerators

An Example of a Compact Storage Ring for Synchrotron Light Sources

Shigemi Sasaki

Hiroshima Synchrotron Radiation Center
Hiroshima University

Bldg. 401, Room B-2100
Friday Nov 4, 2:30 pm

Host: Efim Gluskin

Abstract:

In general, the design orbit in a synchrotron accelerator or a storage ring closes in one turn around the ring, i.e., the length of a closed orbit is equal to the circumference of the ring. On the other hand, a Stellarator or a Heliotron for plasma confinement with magnetic fields has a donut (torus) shape with helically wound coils. Each coil winding does not close in one turn but closes after multiple turns around a torus. The shape of a coil winding on a torus is called torus knot. Similar to the coil winding of a Stellarator, if the beam in an accelerator draws a torus knot trajectory, a design orbit closes after multiple turns.

A realistic multiple-turn lattice can be realized by placing conventional accelerator components on a projected torus knot in the horizontal plane. The ring with this lattice may have larger maximum stored charge in multiple-bunch mode, and longer bunch-to-bunch interval in a single-bunch mode as compared to the same footprint conventional ring. Also, for an electron storage ring as the synchrotron light source, a larger number of straight sections may accommodate with many insertion devices.

This new concept may be applicable not only for a light source ring but also for a compact proton/heavy ion synchrotron or a positron damping ring for ILC for saving space.

For more information visit

http://aps.anl.gov/News/Meetings/Beams_and_Applications_Seminars/

Visitors from off-site please contact Carmen Nolasco (mnolasco@aps.anl.gov, 630-252-6159) to arrange for a gate pass.