



Contribution ID: 202

Type: **Oral presentation**

Channeling for Beams & Radiations. 50..40..30 Years History

Sunday, 25 September 2016 15:50 (30 minutes)

Practically 50 years past since the phenomenology for charged particles channeling in crystals has been proposed by Lindhard. This pioneering work that provides correct description of charged particles motion in oriented crystals at small beam incident angle with respect to main crystallographic directions, resulting in either planar or axial channeling,

was followed by many research papers, reviews and books with a number of brilliant ideas that became well known and even wide used in the world.

Two of these ideas have been finalized in very attractive research branches till now capable proposing new collaborations and projects.

One of them is known as a channeling radiation phenomenon, which was predicted quasi 40 years ago by Kumakhov, recognized as one of the most powerful electromagnetic radiation sources of gamma- and x-ray frequencies by light relativistic charged particles, to be called "crystal undulator". Another strictly related subject of intense research started his history ~ 30 years ago from the construction of the first polycapillary lens at the Laboratory for electromagnetic interactions of the Kurchatov Institute. This technology, known as polycapillary optics, is based on channeling of neutral particles in hollow tubes, especially, on x-ray and neutron channeling in capillaries.

This report will recollect most important discoveries, events and key steps of channeling physics done within various international collaborations.

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Session Classification: Channeling Primer