

## Channeling 2018



Contribution ID: 70

Type: **Oral presentation**

# X-ray Hybrid Radiation

*Monday, 24 September 2018 18:20 (15 minutes)*

Transition and Cherenkov radiation generated by a charge are well known phenomena and find a broad application for different scientific communities. Frank was the first to point out the possibility of interference between transition and Cherenkov radiation [1]. This interference is understandable, since both radiation mechanisms may be described as a secondary electromagnetic field produced by polarization currents that emerge from the interaction of an electromagnetic field of a charge with atomic electrons of the medium. In 1979 Zrelov and Ruzicka conducted theoretical investigations of this interference effect in the visible wavelength range [2]. They showed that the emitted radiation possessed both transition and Cherenkov radiation properties, i.e., that it is a hybrid radiation. However, despite the critical interest for development of new x-ray monochromatic sources, the theoretical investigations ignored this effect in x-ray range.

In this report we present results of the theoretical investigation for x-ray hybrid radiation. Using the polarization current approach [3,4] and the atomic scattering factor formalism [5] to account anomalous dispersion of the complex permittivity we study spectral and angular distributions and polarization properties of x-ray hybrid radiation when a charge passes over a screen.

This work was supported by the Russian Foundation for Basic Research within the Grant No. 18-32-00385\_mol\_a and the Competitiveness Enhancement Program of Tomsk Polytechnic University.

### References

- [1] I.M. Frank, Sov. Phys. Usp. 5 (1962) 740.
- [2] V.P. Zrelov and Ružicka, Nucl. Instrum. Methods. 160 (1979) 327.
- [3] D.V. Karlovets, J. Exp. Theor. Phys. 113 (2011) 27.
- [4] M. Shevelev, A. Konkov and A. Aryshev, Phys. Rev. A. 95 (2015) 053851.
- [5] B.L. Henke et al., A. Data Nucl. Data Tables, 27 (1982) 1.

**Primary author:** Mr SHEVELEV, Mikhail (Tomsk Polytechnic University)

**Co-author:** Mr KONKOV, Anatoly (Tomsk Polytechnic University)

**Presenters:** Mr KONKOV, Anatoly (Tomsk Polytechnic University); Mr SHEVELEV, Mikhail (Tomsk Polytechnic University)

**Session Classification:** S2.2 Channeling & Radiations in Various Fields