Contribution ID: **182** Type: **Poster**

Coherent Cherenkov Radiation by Bunches in Fast Radio Bursts

Friday, 15 December 2023 15:44 (1 minute)

Fast radio bursts (FRBs) are extragalactic radio transients with extremely high brightness temperature, which strongly suggests the presence of coherent emission mechanisms. In this study, we introduce a novel radiation mechanism for FRBs involving coherent Cherenkov radiation (ChR) emitted by bunched particles that may originate within the magnetosphere of a magnetar. We assume that some relativistic particles are emitted from the polar cap of a magnetar and move along magnetic field lines through a charge-separated magnetic plasma, emitting coherent ChR along their trajectory. The crucial condition for ChR to occur is that the refractive index of the plasma medium, denoted as n_r, must satisfy the condition $n_r^2 > 1$. We conduct comprehensive calculations to determine various characteristics of ChR, including its characteristic frequency, emission power, required parallel electric field, and coherence factor. Notably, our proposed bunched coherent ChR mechanism has the remarkable advantage of generating a narrower-band spectrum. Furthermore, a frequency downward drifting pattern, and $\sim 100\%$ linearly polarized emission can be predicted within the framework of this emission mechanism.

Primary author: 刘, 泽南 (南京大学)

Presenter: 刘, 泽南 (南京大学)

Session Classification: Poster