

## Measurement of auroral particles with high-time resolution at the low-altitude orbit (INDEX mission)

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INDEX is a microsatellite which will be inserted into a low-altitude (700-800 km) polar orbit by the H-IIA launch vehicle as a piggyback payload. Low-energy charged particle instruments (ions and electrons) and an auroral imager will be installed in the INDEX. One of the scientific objectives of the INDEX mission is to study generation mechanisms of fine-scale structures within auroral arcs. Therefore the relationship between the fine-scale structures of auroral light emissions and auroral particle distributions will be investigated. Since the typical spatial scale of the auroral arcs observed by ground-based instruments is about 100m, a measurement with high-time resolution is necessary for the INDEX platform.

Ground-based optical measurements of auroral light emissions indicate that the fine-scale structures within the auroral arcs have thickness of about 100 m. However, there is no favorable theory which can produce the auroral arcs with the thickness of about 100 m.

There are also few observational results of auroral particles which correspond to the auroral fine-scale structures. One of the reasons for this fact is that it is difficult to determine the location of the emission region which is connected to the spacecraft by the geomagnetic field with enough accuracy. In case of low-altitude spacecraft, measurements with high-time resolution are necessary, since the spacecraft velocity is fast. On the other hand, tracing of the geomagnetic field becomes difficult in case of spacecraft on a higher altitude orbit. Recently, the FAST spacecraft is measuring the auroral particles with high-time resolution. However, plasma structures which correspond to the fine-scale structures of auroral arcs have not been found yet. This might indicate that the fine-scale structures are formed in the lower altitude than the FAST orbit.

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