

## Extremely collimated electron beams observed by the ERG satellite

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The ERG satellite occasionally observes extremely collimated field aligned electron beams in high latitude regions at  $L \sim 6$  or farther. The electron beams are mainly flowing in the anti-parallel direction in the northern hemisphere and in the parallel direction in the southern hemisphere, i.e. in the direction away from the ionosphere. Observations also show that the beams are frequently counter-streaming along the field line. Phase space density distributions measured by the LEPE instrument reveal that the beams are collimated within several degrees in pitch angle, which indicates beam electrons of the ionospheric origin. According to a statistical study of beam events, the beams are seen more frequently when the AE index is larger. In addition, field lines of the beams can be traced back to the auroral oval on the ionosphere. The observational results suggest that the extremely collimated electron beams are most probably accelerated upward by a downward electric field in response to auroral activities and are streaming along the field line. Upward flowing electrons in low altitudes and also tailward electrons in the tail have been reported, and this beam observation at ERG locations can complete a global picture of electron beams.