



## **Kristian Birkeland, The First Space Scientist**

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Birkeland's (1867-1917) pioneering research in geophysics contributed greatly to the study of solar-terrestrial physics. He puzzled over the links between the aurora and disturbances of the Earth's magnetic field. Before the end of his career he had elucidated many features of the process through which electrons and ions gain energy through interactions with magnetic fields in near-Earth space and stream into the upper atmosphere where they excite particles whose glow we observe from the ground.

Birkeland's work on aurora, polar storms including the global pattern of currents in the

Earth's upper atmosphere, the Sun's particle radiation, Saturn's rings and comets will be summarized.

The 60 patents of Birkeland, related to eight different fields, stand as a living tribute to his practical genius. His first one concerned an electromagnetic cannon similar in concept to a rail gun. Birkeland's electric arc furnace is the foundation for industrial nitrogen fixation, and the founding of Norsk Hydro, still Norway's largest industrial enterprises. His plasma torch is nowadays used in several new technological developments.