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Modeling radio emission from particle showers in dense media and air: a pedagogical overview.

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I will review the current understanding of radio emission from particle showers in both dense dielectric media and the atmosphere. A net charge is generated in those showers due to the Askaryan effect in dense media, and to Askaryan as well as geomagnetic effects in air. I will discuss macroscopic and microscopic approaches to model the emitted radiation. The prominent role of shock wave effects similar to those observed in Cherenkov radiation will be emphasized.

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