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Shock generated electron beams in the solar corona

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In the solar corona shock waves can be produced by flares and/or coronal mass ejections. Type II radio bursts represent signatures of coronal shock waves in the solar radio radiation. Shock accelerated electron beams appear as rapidly drifting emission stripes (so-called “herringbones”) within type II radio bursts. A large sample of “herringbones” and solar type III radio bursts is statistically analysed concerning their properties in dynamic radio spectra. As well-known, type III radio bursts are regarded as signatures of electron beams immediately generated by the flare process. The analysis provides that electron beams associated with type III bursts have a higher velocity than those generated by shock waves. The velocity of electrons associated with the “herringbones” is found to be about 30,000 km/s. These beams are considered to be generated by shock drift accleration. Then, the accelerated electrons establish a shifted loss-cone distribution in the upstream region of the shock. Such a distribution is unstable and leads to the emission of radio waves as observed as “herringbones”.