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Role of return current in maintaining a flare and energetic electron numbers

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In this talk I will demonstrate with time-dependent Fokker-Planck calculations that steady injection of energetic electron beams into loop legs is compensated by returning electrons scattered the precipitating beams combined with the accelerated electrons from the ambient plasma. We evaluate the time for establishing the electric circuit of precipitating and returning electrons. We also evaluate a proportion of the precipitating an ambient electrons contributing to the return current and their resulting HXR emission in loop legs affected by collisions, Ohmic losses, pitch-angle scattering in converging magnetic field. By evaluating velocities of precipitating and returning electrons it was shown that the particle density numbers producing the observed HXR emission cannot exceed 1-10% of the ambient coronal density.

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