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Unstable plasmons in extrinsic graphene with injected carriers<sup>1</sup> BEN YU-KUANG HU, The University of Akron, ANTTI-PEKKA JAUHO, Helsinki University of Technology and Tech. U. of Denmark — We theoretically study the plasmons (*i.e.*, the charge density collective modes) of a graphene system into which is injected carriers with a sharply peaked distribution function in momentum-space. We find that when this stream of carriers is injected into intrinsic graphene, the collective modes are stable. However, when the stream of carriers is injected into extrinsic (*i.e.*, doped) graphene, under certain circumstances the plasmons of the system become unstable and (initially) grow exponentially. This is analogous to the two-stream instablity in plasma physics, which occurs when, for example, a stream of electrons is injected into a stationary plasma. In the graphene system, the dopant carriers in extrinsic graphene and the injected stream of carriers play the role of the stationary plasma and the injected electrons in the plasma case, respectively.

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