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The interplay of magnetically-dominated turbulence and reconnection in producing non-thermal particles LUCA COMISSO, LORENZO SIRONI, Columbia University — Magnetized turbulence and reconnection are often invoked to explain the observed non-thermal emission from a wide variety of astrophysical sources. With fully-kinetic particle-in-cell simulations, we study the interplay between turbulence and reconnection in generating non-thermal particles in magnetically-dominated (or equivalently, relativistic) pair plasmas. We find that magnetic reconnection, which self-consistently occurs in the turbulent plasma, is efficient in injecting particles out of the thermal pool. The particles are then further accelerated to high energies by stochastic scattering off turbulent fluctuations. As a result, the turbulent plasma produces an extended non-thermal particle energy spectrum with a power-law energy range. The power-law slope is harder for larger magnetizations and higher turbulence fluctuations, while the initial plasma temperature enters only as an overall energy shift — everything else being fixed. The non-thermal tail typically contains a large fraction of particles and extends up to the limit set by the size of the largest turbulent eddies. These results have important implications for the origin of non-thermal particles in high-energy astrophysical sources.

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