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Stochastic acceleration by the ion-cyclotron instability in a growing magnetic field[1] FRANCISCO LEY, University of Wisconsin - Madison, MARIO RIQUELME, Universidad de Chile, LORENZO SIRONI, Columbia University, DANIEL VERSCHAREN, University College London, ASTOR SANDOVAL, Pontificia Universidad Catlica de Chile — Using 1D and 2D particle-in-cell (PIC) simulations of a plasma with a growing magnetic field $\vec{B}$, we show that ions can be stochastically accelerated by the ion-cyclotron (IC) instability. As $\vec{B}$ grows, an ion pressure anisotropy $p_{\perp,i} > p_{||,i}$ arises, due to the adiabatic invariance of the ion magnetic moment ($p_{||,i}$ and $p_{\perp,i}$ are the ion pressures parallel and perpendicular to $\vec{B}$). When initially $\beta_i = 0.5$ ($\beta_i \equiv 8\pi p_i/|\vec{B}|^2$, where p_i is the ion isotropic pressure), the pressure anisotropy is limited mainly by inelastic pitch-angle scattering provided by the IC instability, which in turn produces a non-thermal tail in the ion energy spectrum. After $\vec{B}$ is amplified by a factor ~ 2.7, this tail can be approximated as a power-law of index ~ 3.4 plus two non-thermal bumps, and accounts for $2-3\%$ of the ions and $\sim 18\%$ of their kinetic energy.Although we focus on cases where $\vec{B}$ is amplified by plasma shear, we check that the acceleration occurs similarly if $\vec{B}$ grows due to plasma compression. Our results are valid in sub-relativistic regimes where the ion thermal energy is $\sim 10\%$ of the ion rest mass energy. This mechanism can be relevant in low-luminosity accretion disks

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