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UHECR Acceleration at Filaments of Cosmological Structure Formation[1] ROALD SAGDEEV, University of Maryland, MIKHAIL MALKOV, PATRICK DIAMOND, UCSD — A mechanism of particle acceleration to $\sim 10^{21} eV$ is suggested. It operates in accretion flows around thin DM filaments of cosmic structure formation. The magnetic field is compressed by the flow to become nearly parallel to the filament. Initially, particles $\mathbf{E} \times \mathbf{B}$ drift towards the filament in the azimuthal electric field $\mathbf{E}$. Upon approaching the filament, the particle *drift* changes to a nearly *circular* rotation around the filament, i.e. along the motion electric field. In this "betatron" acceleration regime the electrodynamic limit on the particle energy $cp_{max} = eBR$ in an accelerator with the orbit radius R and magnetic field B, is reached very rapidly. As soon as p exceeds p_{max}, the particle slings out of the filament to the region of a weak (uncompressed) magnetic field and the acceleration is terminated. The mechanism is a re-acceleration that operates on particles with the required initial energy. Particle pre- acceleration is likely to occur in structure formation shocks. Such shocks are efficient proton accelerators to a firm upper limit $\sim 10^{19.5} eV$ placed by the catastrophic photo-pion losses. The suggested mechanism, being explosive in its betatron phase, has a potential to overcome the losses and boost protons to $\sim 10^{21} eV$.

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