Consequences of electron reflection back upstream in oblique shocks

PIC Simulations - Electron Injection - Upstream Turbulence

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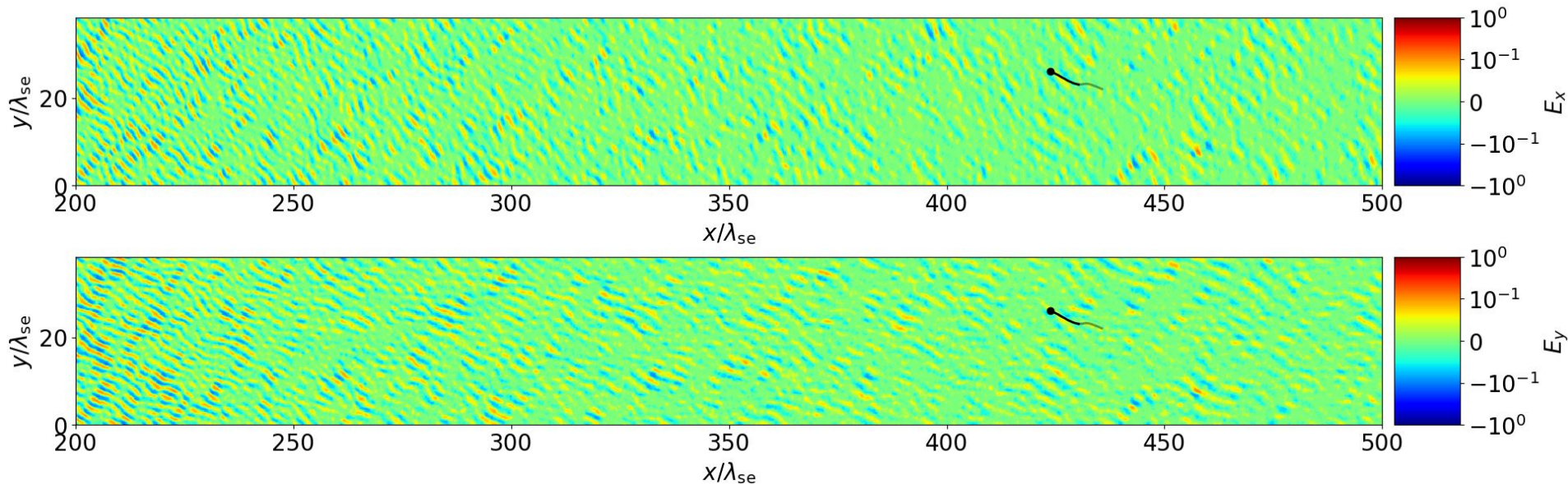ICRC 2021
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1.
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Reflected electrons generate electrostatic waves, which can interact with upstream electrons
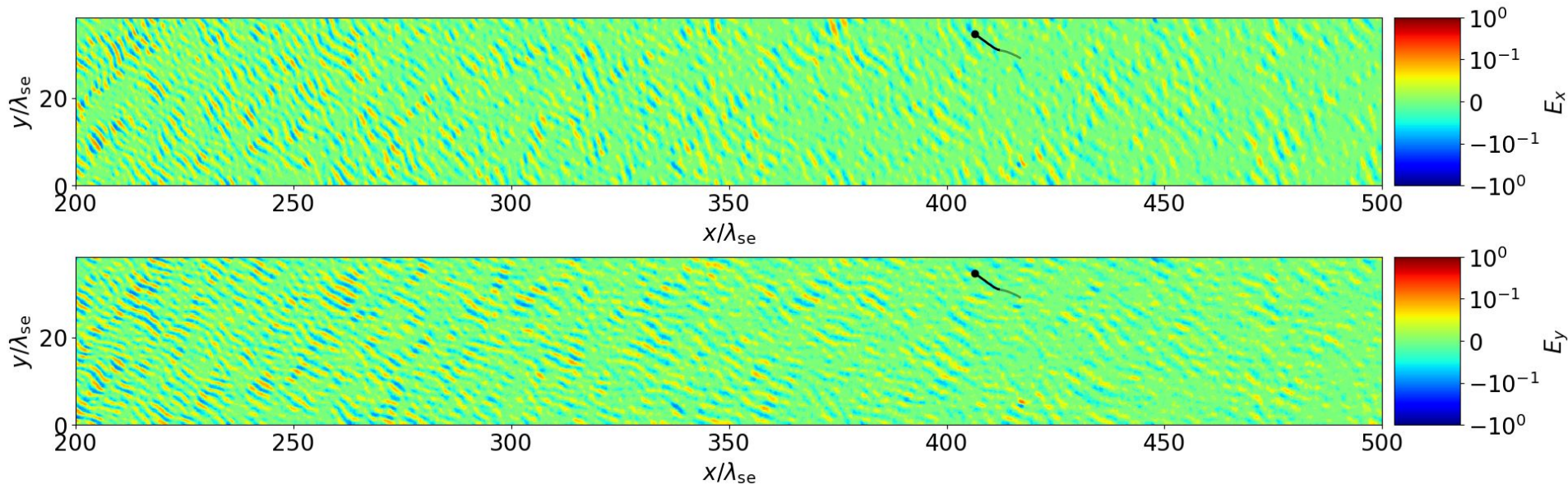
$\Omega_i t = 3.80$

- The above animation show an upstream electron (black) interacting with the electrostatic field (top: E_x, lower: E_y components). This field was generated by reflected electrons. The upstream electron gains energy in these directions and is turned away from the shock (left of animation) in the upstream region. Here, $\theta_{Bn} = 45°$

Reflected electrons generate electrostatic waves, which can interact with upstream electrons
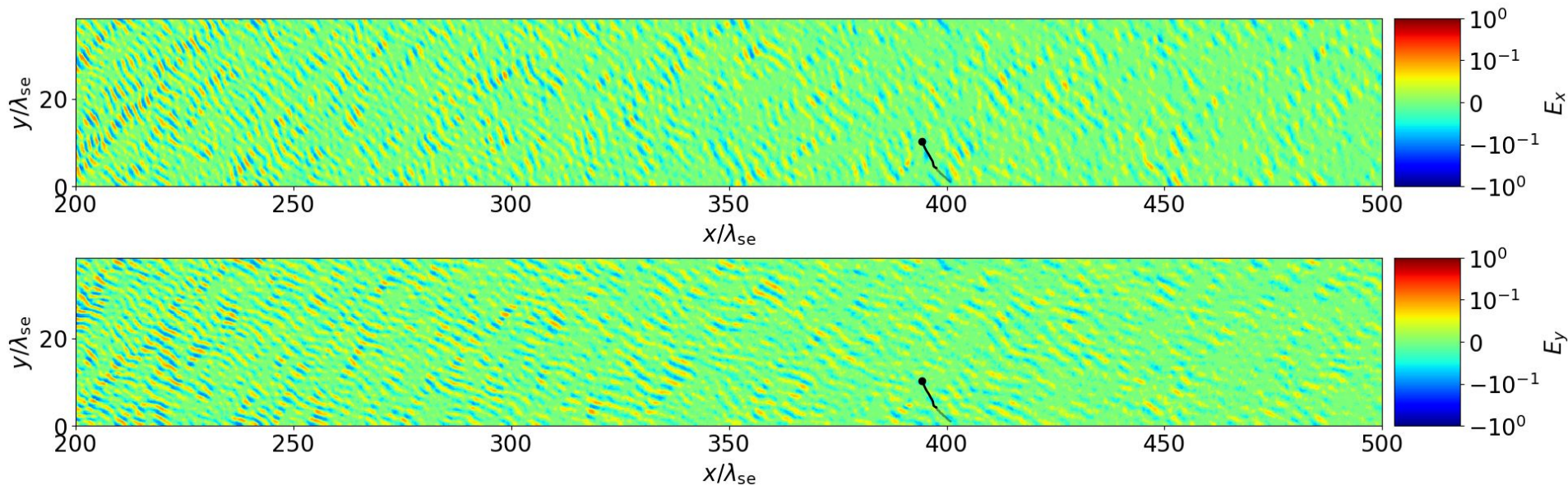

$\Omega_i t = 4.00$

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Reflected electrons generate electrostatic waves, which can interact with upstream electrons
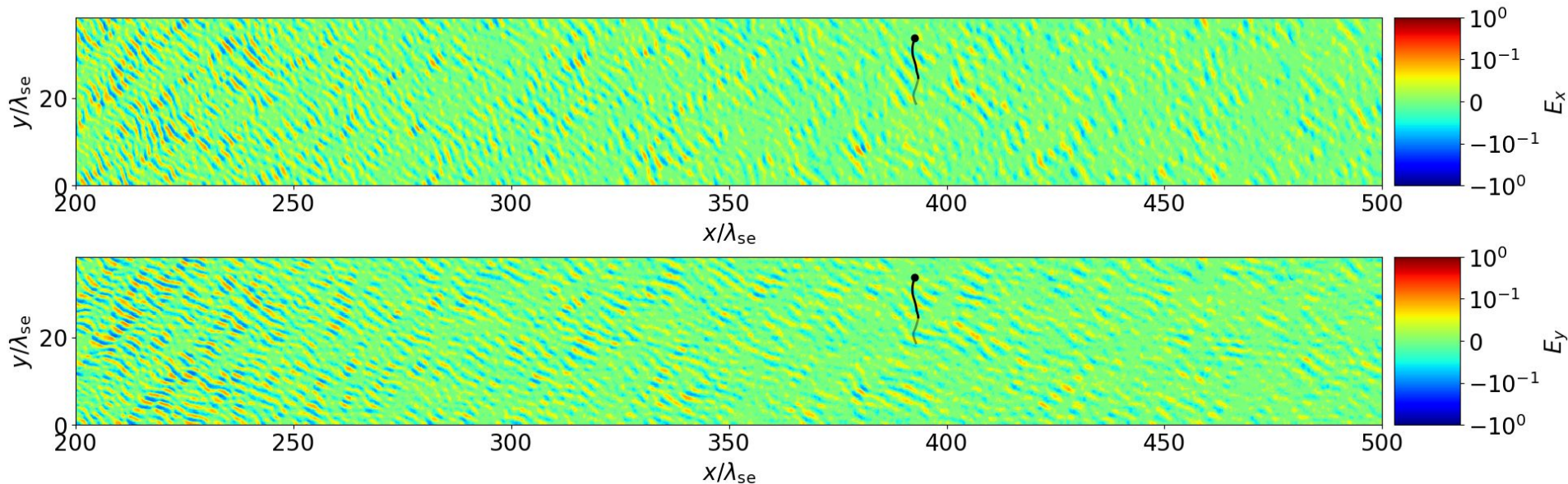
$\Omega_i t = 4.20$

- The above animation show an upstream electron (black) interacting with the electrostatic field (top: E_x, lower: E_y components). This field was generated by reflected electrons. The upstream electron gains energy in these directions and is turned away from the shock (left of animation) in the upstream region. Here, $\theta_{Bn} = 45°$

Reflected electrons generate electrostatic waves, which can interact with upstream electrons
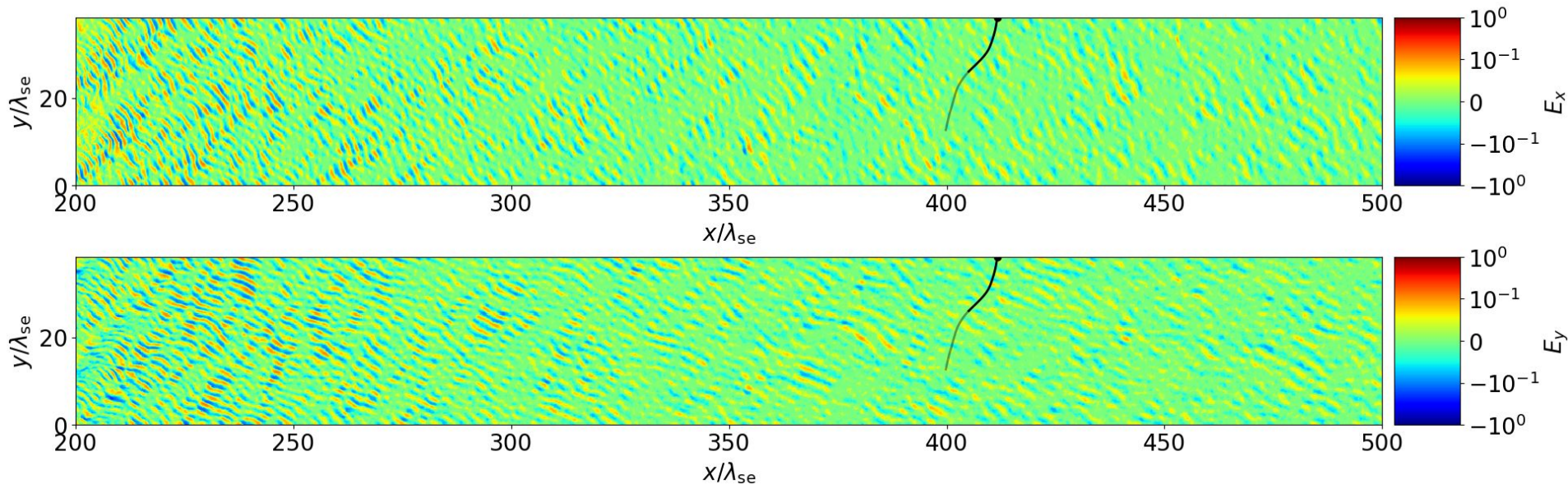

$\Omega_i t = 4.40$

- The above animation show an upstream electron (black) interacting with the electrostatic field (top: E_x, lower: E_y components). This field was generated by reflected electrons. The upstream electron gains energy in these directions and is turned away from the shock (left of animation) in the upstream region. Here, $\theta_{Bn} = 45°$

Reflected electrons generate electrostatic waves, which can interact with upstream electrons

$\Omega_i t = 4.60$

- The above animation show an upstream electron (black) interacting with the electrostatic field (top: E_x, lower: E_y components). This field was generated by reflected electrons. The upstream electron gains energy in these directions and is turned away from the shock (left of animation) in the upstream region. Here, $\theta_{Bn} = 45°$