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A simulation of flare-driven coronal rain

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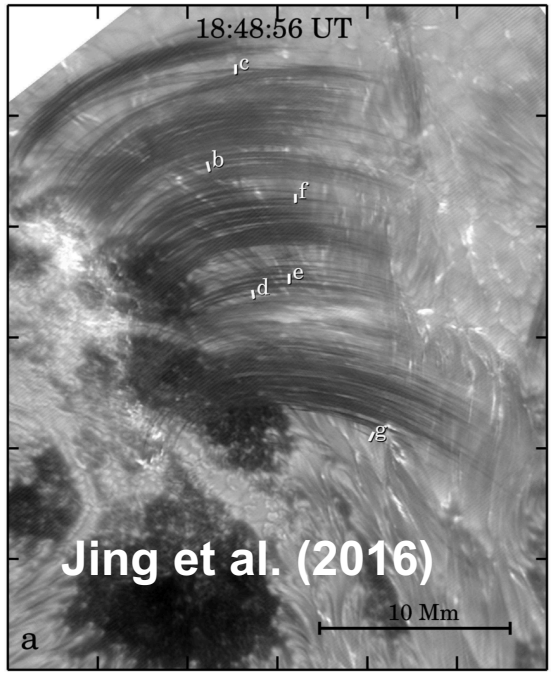
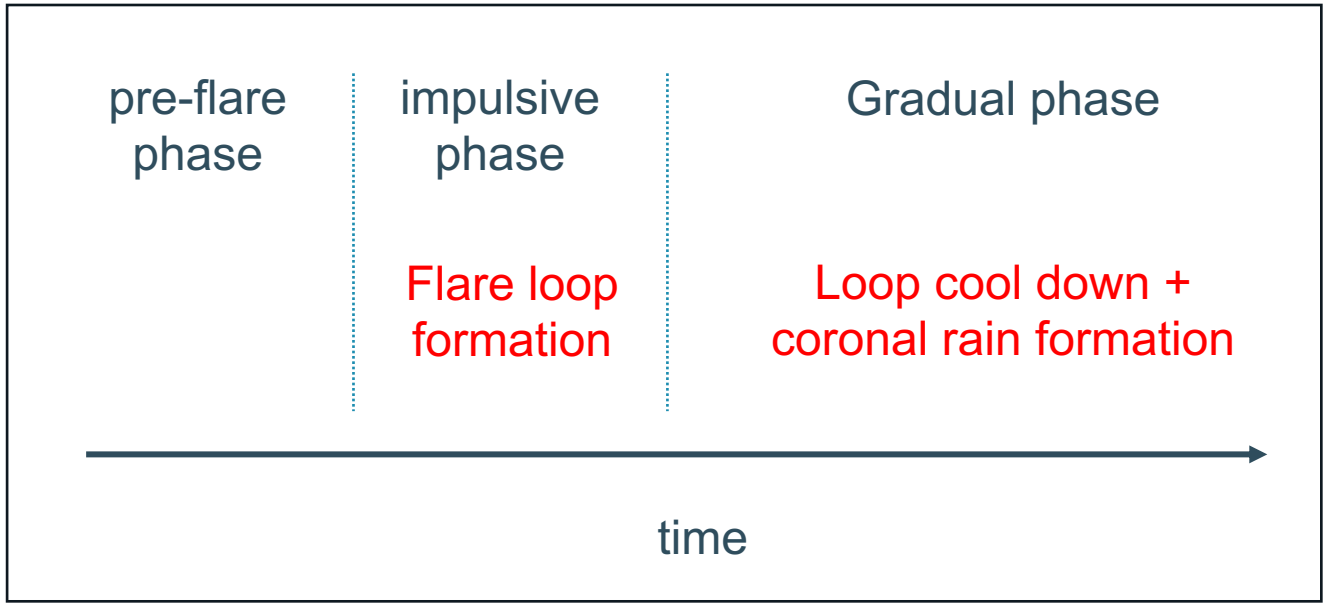
Cool coronal rain (~10,000 K) in hot flaring regions

Flare loops at gradual phase

Hα + 1.0 Å



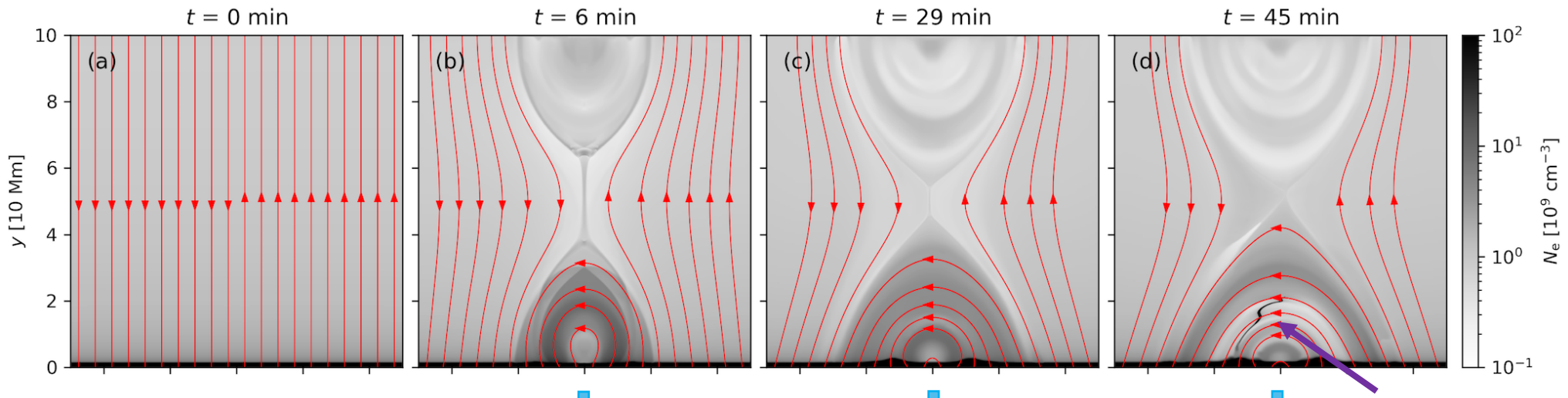


More observations:
Schmieder et al.,1995,1996 ;Martínez Oliveros et al. 2014;
Scullion et al. 2014; Scullion et al. 2016; Jejčič et al. 2018 …

Simulating the coronal rain in flare loops

Time evolution of density ➡

Magnetic field



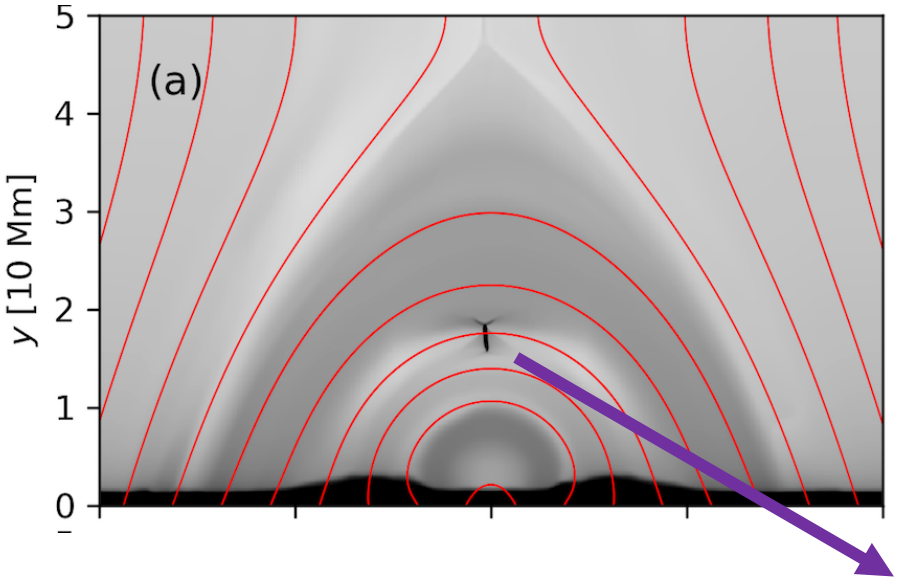
Low density corona + initial current sheet

High density flare loop produced by reconnection

Loop density is still high at gradual phase

Condensation happens

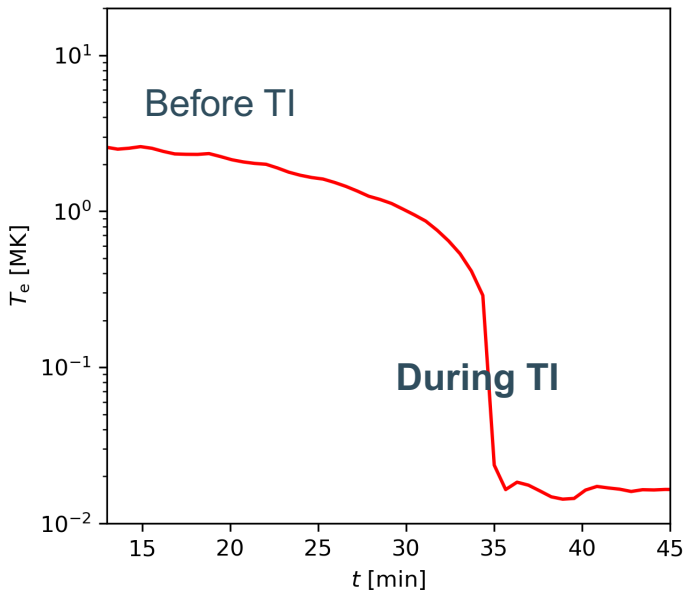
Temperature & density variation in condensation

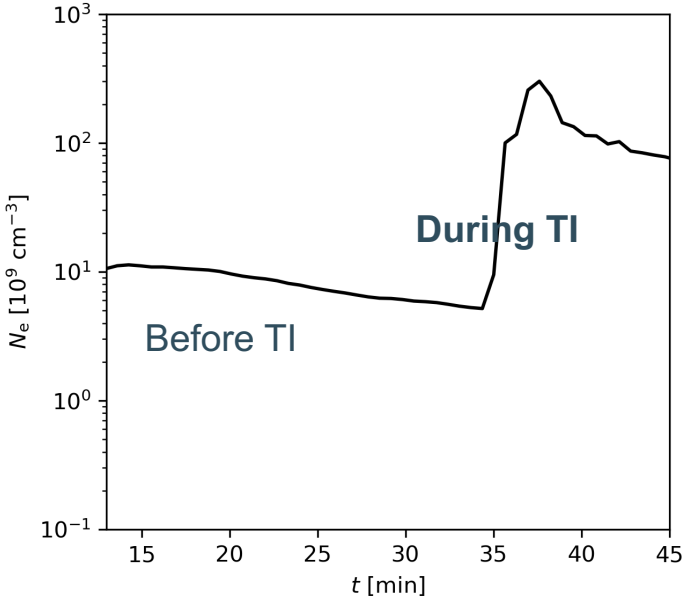


Temperature drop rapidly

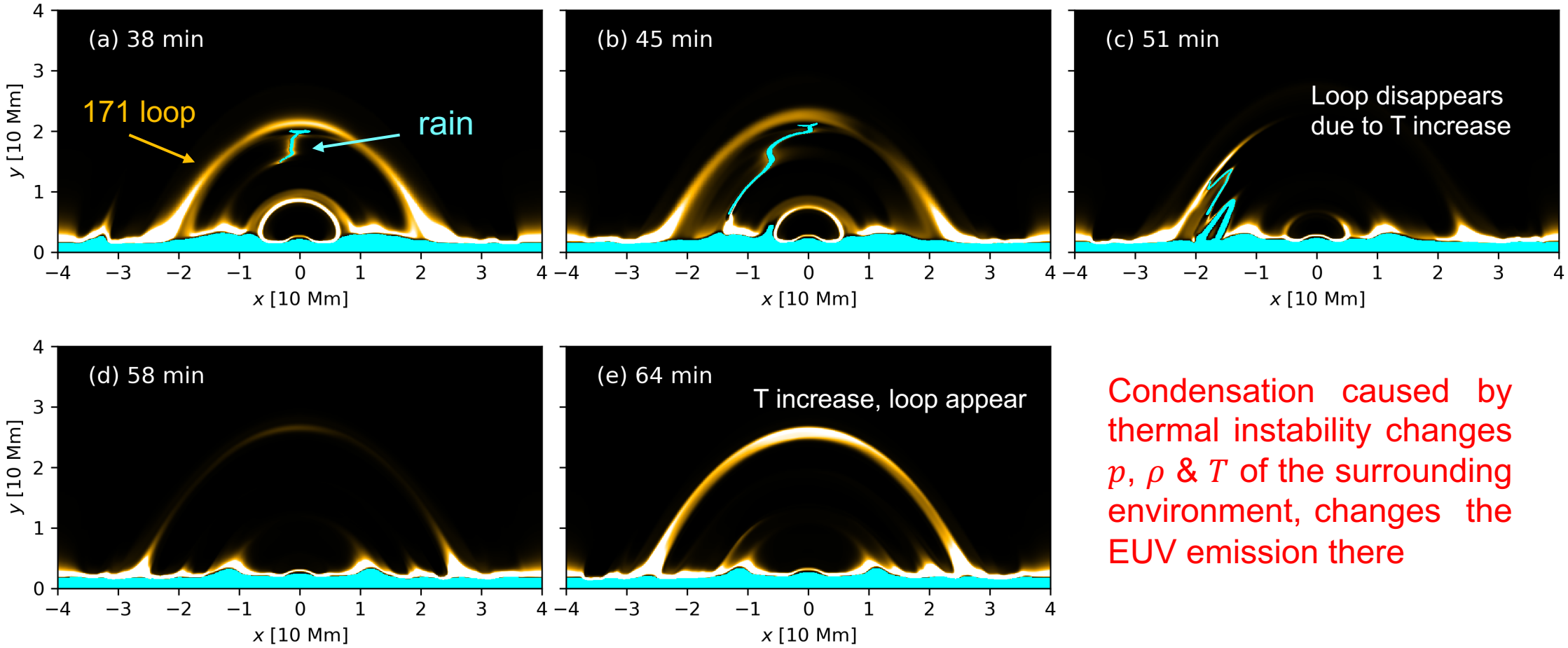
Density increase rapidly

during thermal instability (TI)





EUV (AIA 171) variation caused by condensation



Condensation caused by thermal instability changes p, ρ & T of the surrounding environment, changes the EUV emission there

Conclusions

- Coronal rain can be produced inside flare loop due to thermal instability.

- Condensation can change the pressure, density & temperature of the surrounding environment, and lead to EUV emission variation there.

Thank you for your attention !!