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Possible heating mechanism(s) of solar hot coronal loops

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There are two types of active region loops in the solar corona: warm loops with temperatures of about 1 MK (Ugarte-Urra et al. 2009) and hot ones with temperatures above 2 MK (Brooks et al. 2008). There are convincing evidence suggesting that the heating mechanism of the “warm loops” is by storms of nanoflares (Warren et al. 2003; Klimchuk 2006, 2009; Ugarte-Urra et al. 2009). However, for “hot coronal loops” there is no agreement on the possible heating mechanism(s). Antichos et al. 2003 using TRACE data concluded that the heating could not be from flare like events, and should be quasi-steady. Some other observations from Hi-C and SDO represented signatures of reconnection events, like coronal nanoflares (Testa et al. 2013). On the other side, there is some observational evidence indicating that magneto-acoustic waves powering the heating in hot coronal loops (Hashim et al. 2021).

High temperatures of hot coronal loops made it hard to resolve the loop structures. Therefore, researchers focused to study the footpoint of hot coronal loops called “moss” to find indirect observational constrains of the existing heating mechanism(s).

In this work using high resolution data of IRIS, along with simultaneous observations of SDO and SOT, and EIS (in HOP 247), we study the moss area properties through spectroscopy and imaging. We found some periodicities in the intensity and linewidth of the C II 1334.5323 emission line in the moss area. More spectral lines are aimed to study in this work to achieve a more solid conclusion.

Student poster?

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