Contribution ID: **117** Type: **Poster**

# A model for heating the super-hot corona in solar active regions

What physical mechanisms heat the outer solar or stellar atmosphere to million-kelvin temperatures is a fundamental but long-standing open question. In particular, the solar corona in active-region cores contains an even hotter component reaching 10 MK, manifesting as persistent coronal loops in extreme ultraviolet and soft X-ray images, which imposes a stringent energy budget. Here, based on the MURaM code, we present a self-consistent coronal heating model using a state-of-the-art three-dimensional radiative magnetohydrodynamics simulation. We find that the continuous emergence of magnetic flux in active regions keeps driving magnetic reconnections above the coronal loops at a current sheet embedded in a fan-spine-like magnetic topology, which release energy impulsively but are persistent over time on average. As a result, numerous substructures are heated to 10 MK and then evolve independently. These collectively form the long-lived and stable coronal loops that have been observed. This process provides a heating model that explains the origin of the super-hot coronal plasma and the persistence of hot coronal loops in emerging active regions.

**Primary author:** LU, Zekun (Nanjing University)

**Co-authors:** WANG, Can (Nanjing University; Kyoto University); Prof. CHEN, Feng (Nanjing University); Prof. DING, Mingde (Nanjing University); CHENG, Xin (Nanjing University); Prof. DAI, Yu (Nanjing University)

**Session Classification:** Coffee break and poster session 1

**Track Classification:** Energy and mass transfer throughout the solar atmosphere and structures within