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Non-thermal lobe of the Milky Way powered by the Galactic Center outflows

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The large-scale structures such as Fermi Bubbles and eROSITA Bubbles provide a unique opportunity to study our Milky Way. However, the nature and origin of these large structures are still under debate. In this talk, I will present the identification of several kpc-scale magnetised structures based on their polarized radio emission and their gamma-ray counterparts, which can be interpreted as the radiation of relativistic electrons in the Galactic magnetic halo. These non-thermal structures extend far above and below the Galactic plane and are spatially coincident with the thermal X-ray emission from the eROSITA Bubbles. The morphological consistency of these structures suggests a common origin, which can be sustained by Galactic outflows driven by the active star-forming regions located at 3 – 5 kpc from the Galactic Centre. These results reveal how X-ray-emitting and magnetised halos of spiral galaxies can be related to intense star formation activities and suggest that the X-shaped coherent magnetic structures observed in their halos can stem from galaxy outflows.

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