Polar Coronal Plumes: Flux Tubes or Veiled Structures?

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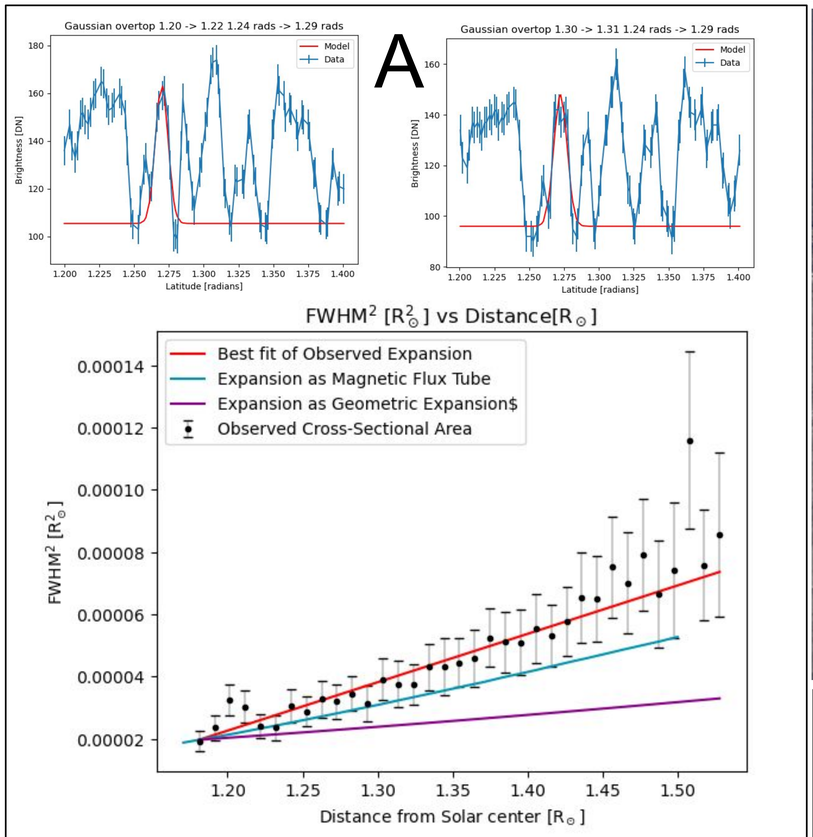
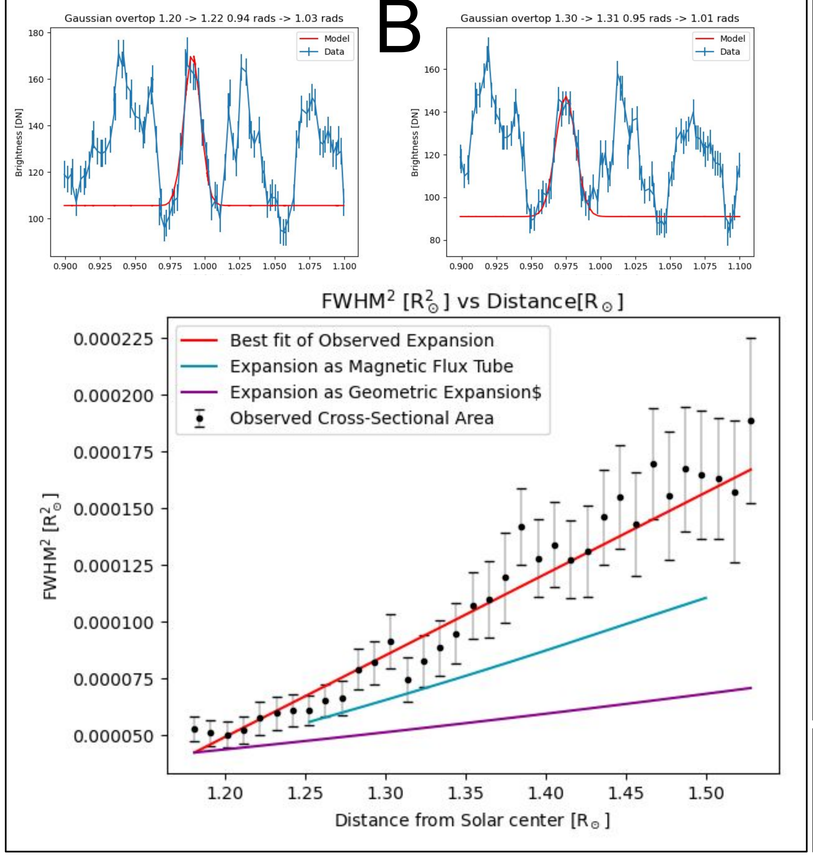
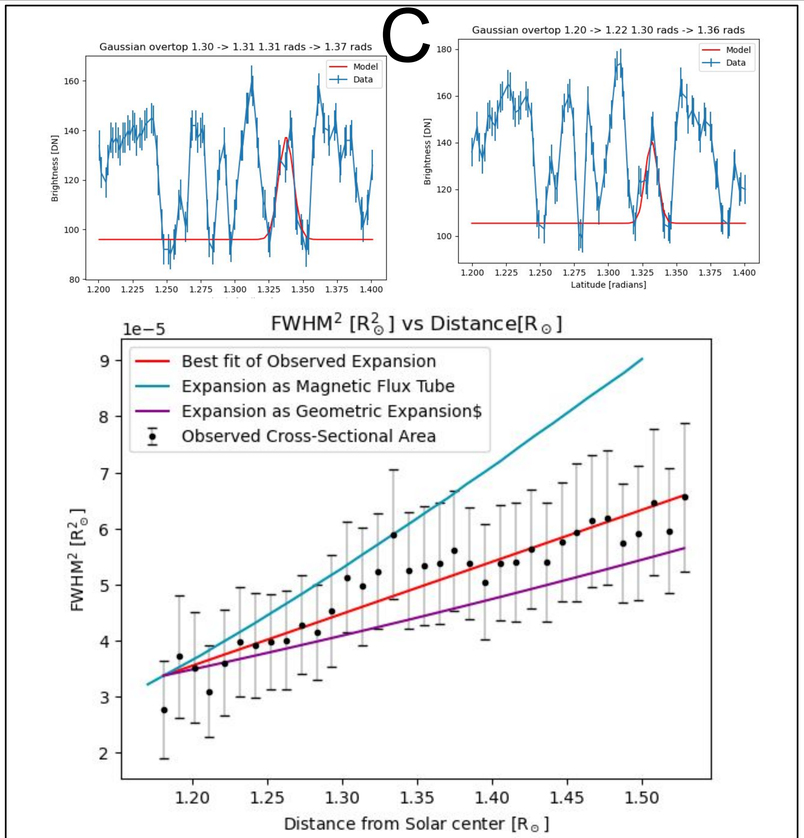
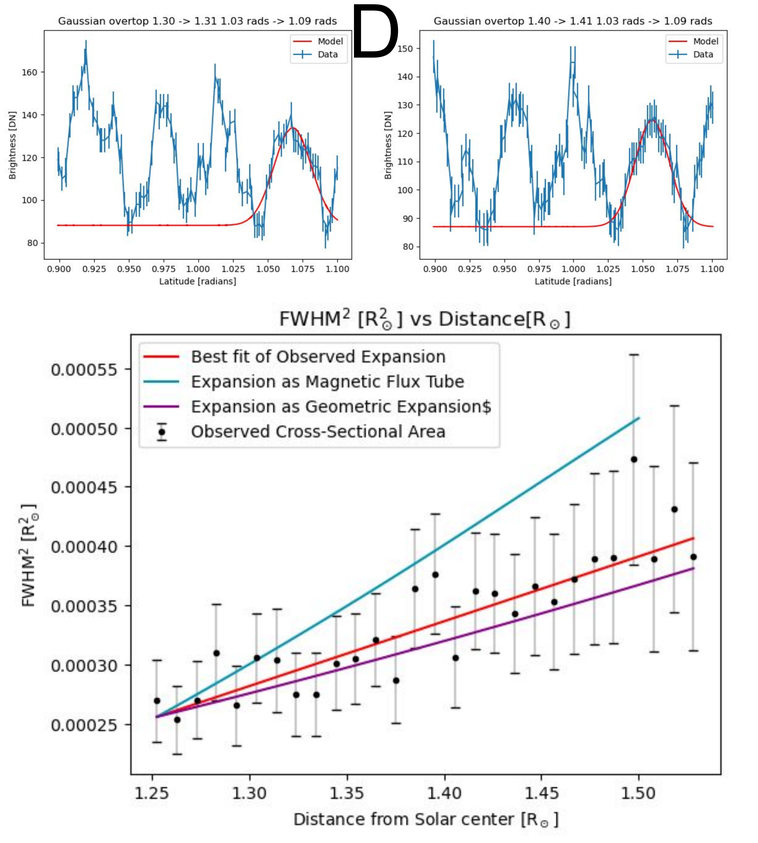




For all plumes **ABCD**, the top two figures show how Gaussians were fit to the polar plume profiles to determine the width and area of the plumes.
The bottom figure shows the expansion of the plumes. The observed expansion of the plumes is plotted with the theoretical expansion if the plumes grew as magnetic flux tubes or if they grow geometrically, i.e as R^2





Abstract

Malanushenko et al (2022) challenged the identification of coronal loops as monolithic flux tubes by using 3D MHD simulations to demonstrate the identification could be the consequence of projection effects of complex structures along the line of sight. This same ambiguity could be creating the polar plumes in polar coronal holes. Using the 2017 August 21st total solar eclipse, the polar plumes expansion rate will be measured to understand if these plumes grow as magnetic flux tubes, conserving magnetic flux as they expand in cross sectional area, or if the plumes grow geometrically, i.e as R^2, which is not fast enough to conserve magnetic flux. This work appears to indicate the presence of multiple types of polar plumes emanating from the polar regions of the Sun.

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