

What is causing the spirals in the disc around Elias 2-27?

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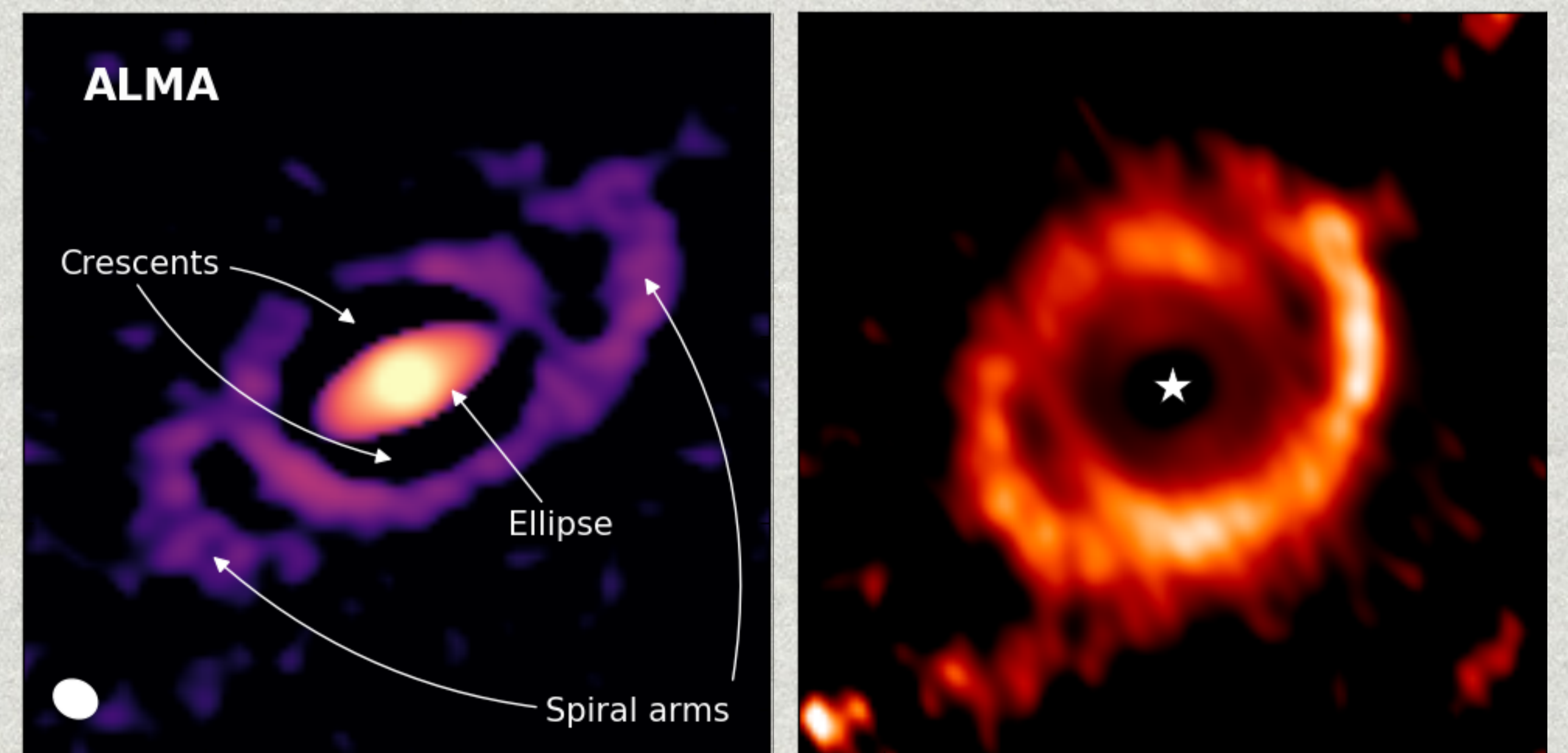
BACKGROUND:

Recent ALMA observations of the Elias 2-27 disc show the first image of a disc with a two armed spiral structure in its midplane

What is causing the spirals?

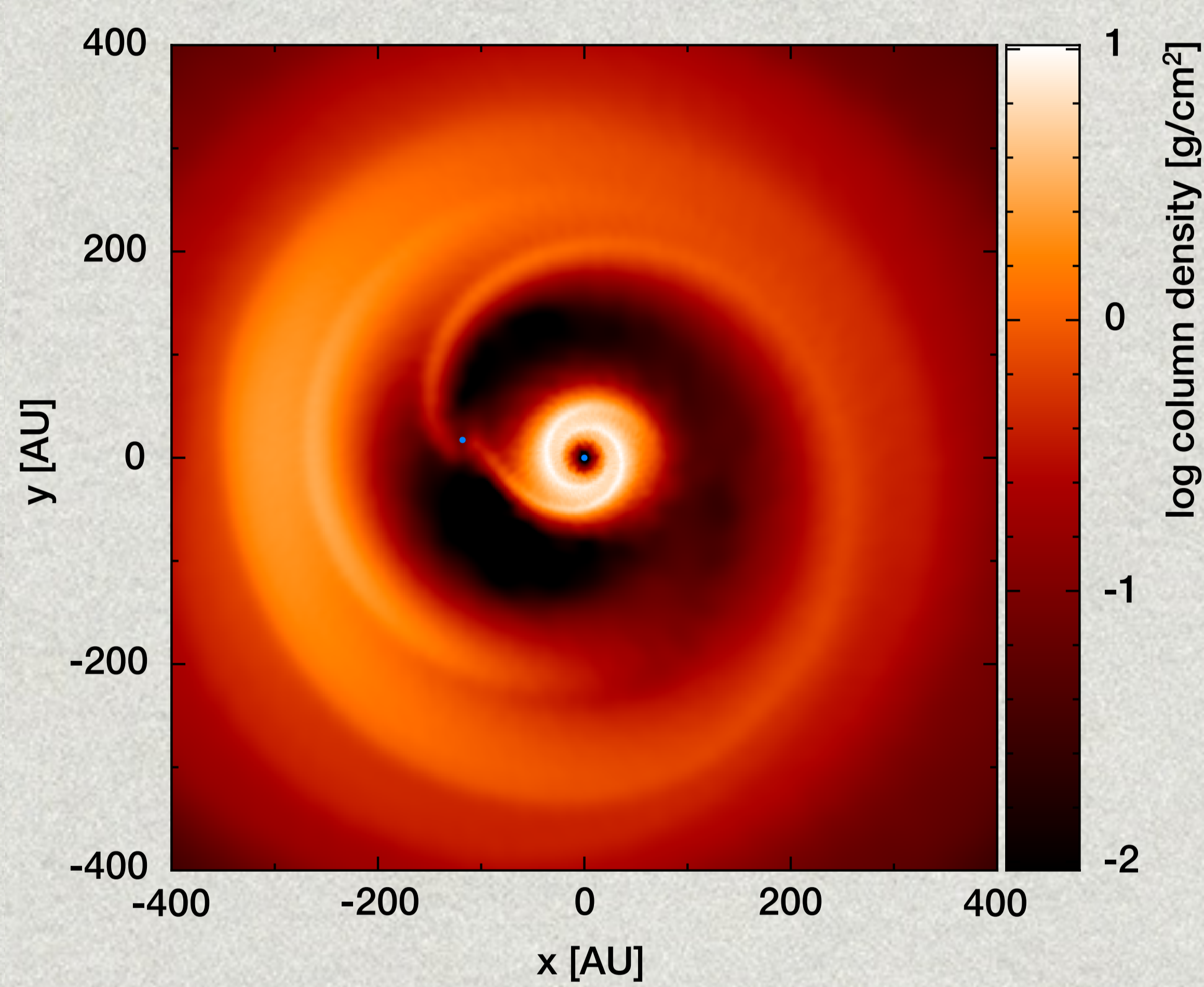
Left: 1.3mm continuum image of the Elias 2-27 disc processed with an unsharp masking filter (originally by Perez et al 2016)

Right: Deprojection of the original 1.3mm image with an r^2 scaling, showing two large scale spirals

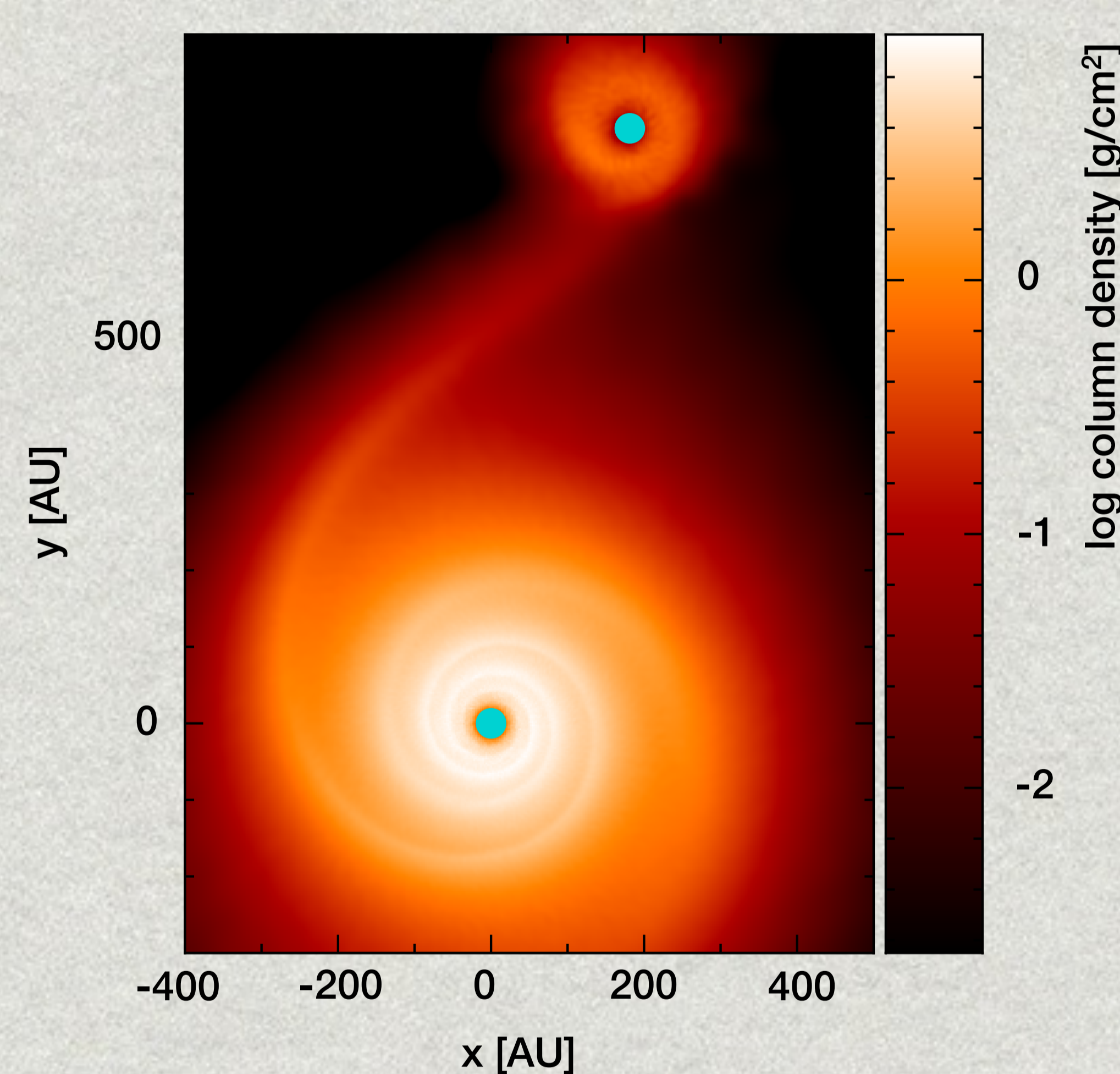


INVESTIGATION: Using hydrodynamical simulations, radiative transfer modelling, synthetic ALMA imaging and an unsharped masking technique we explore:

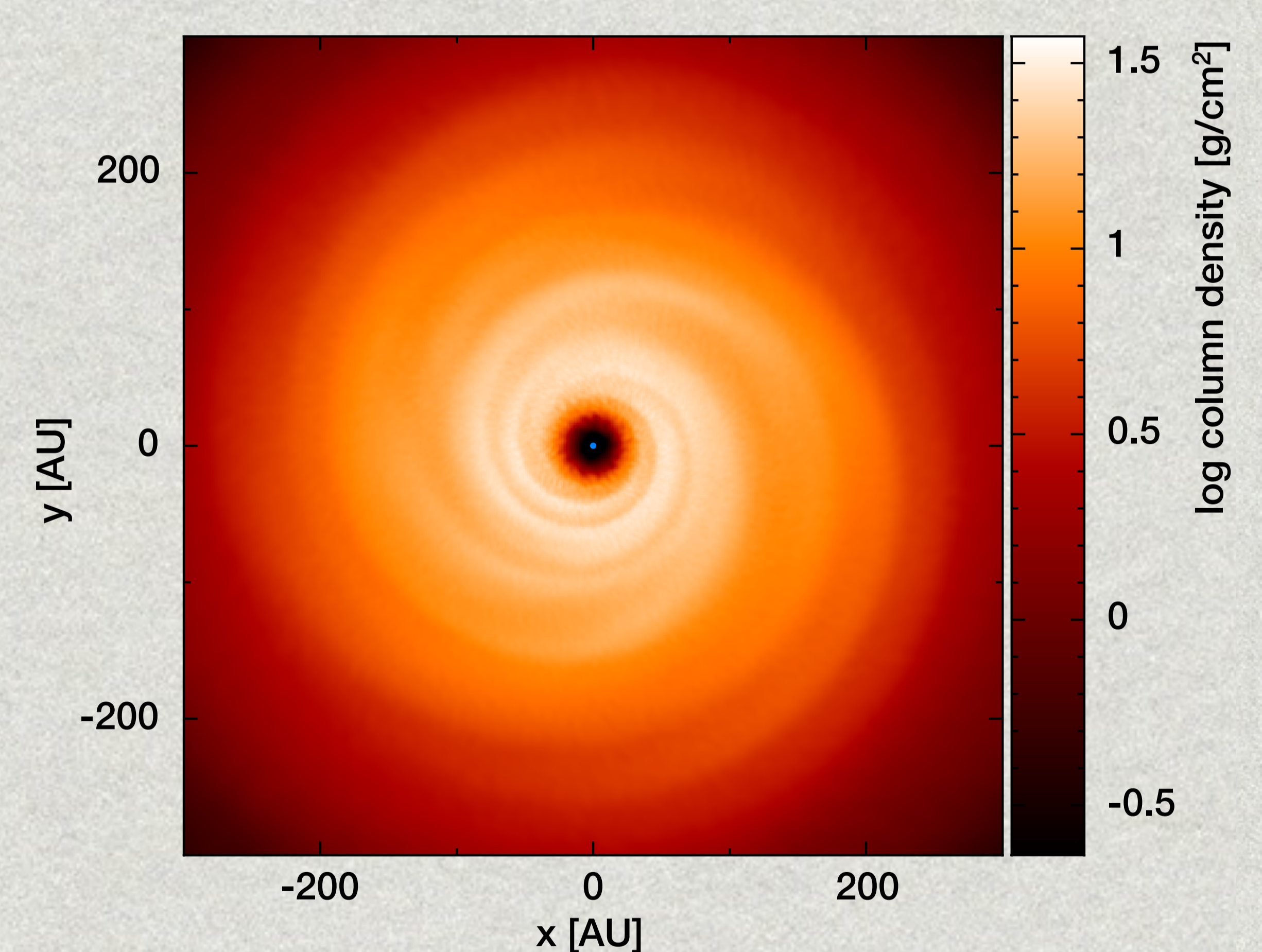
1. A companion interior to the spirals



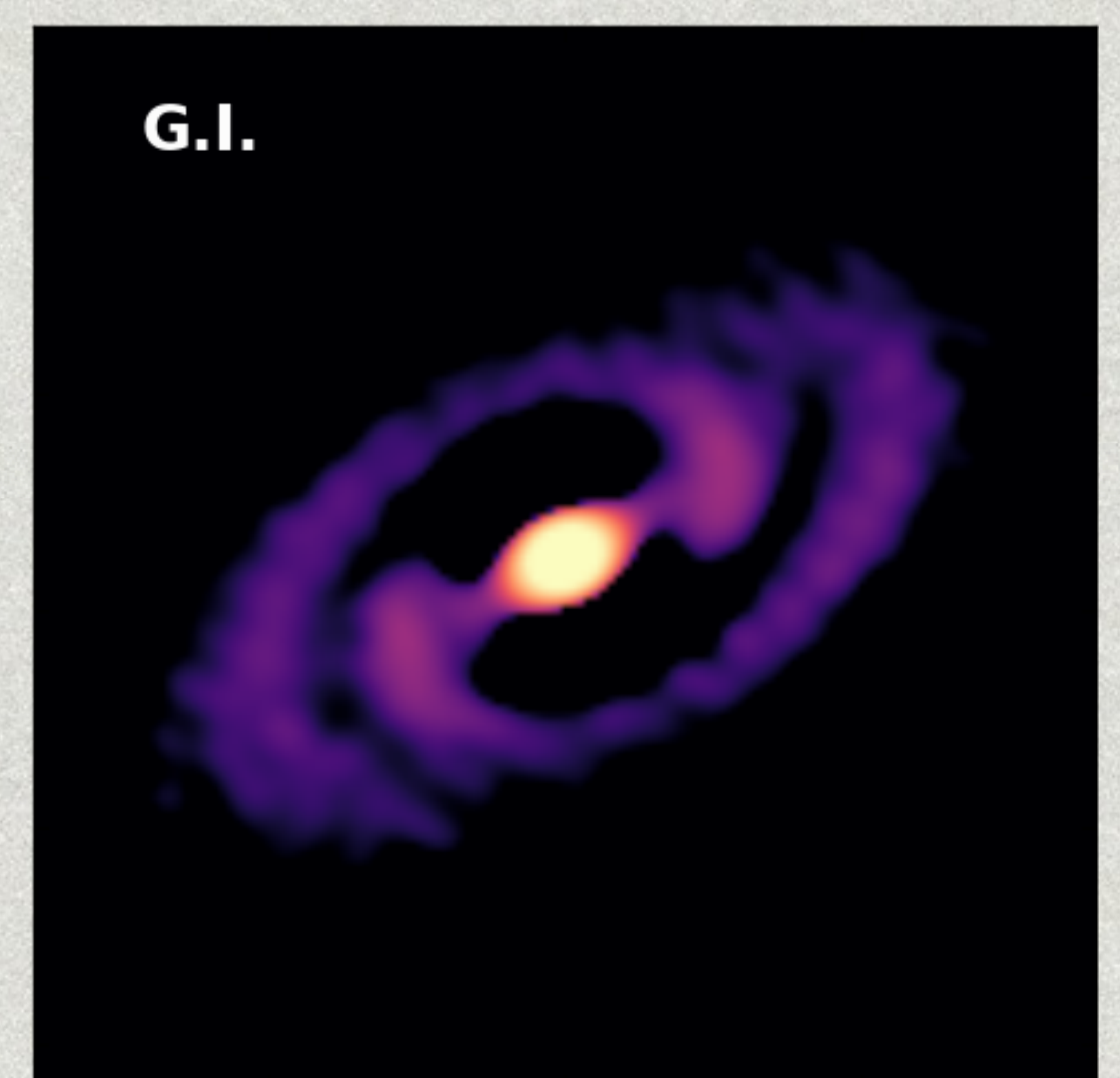
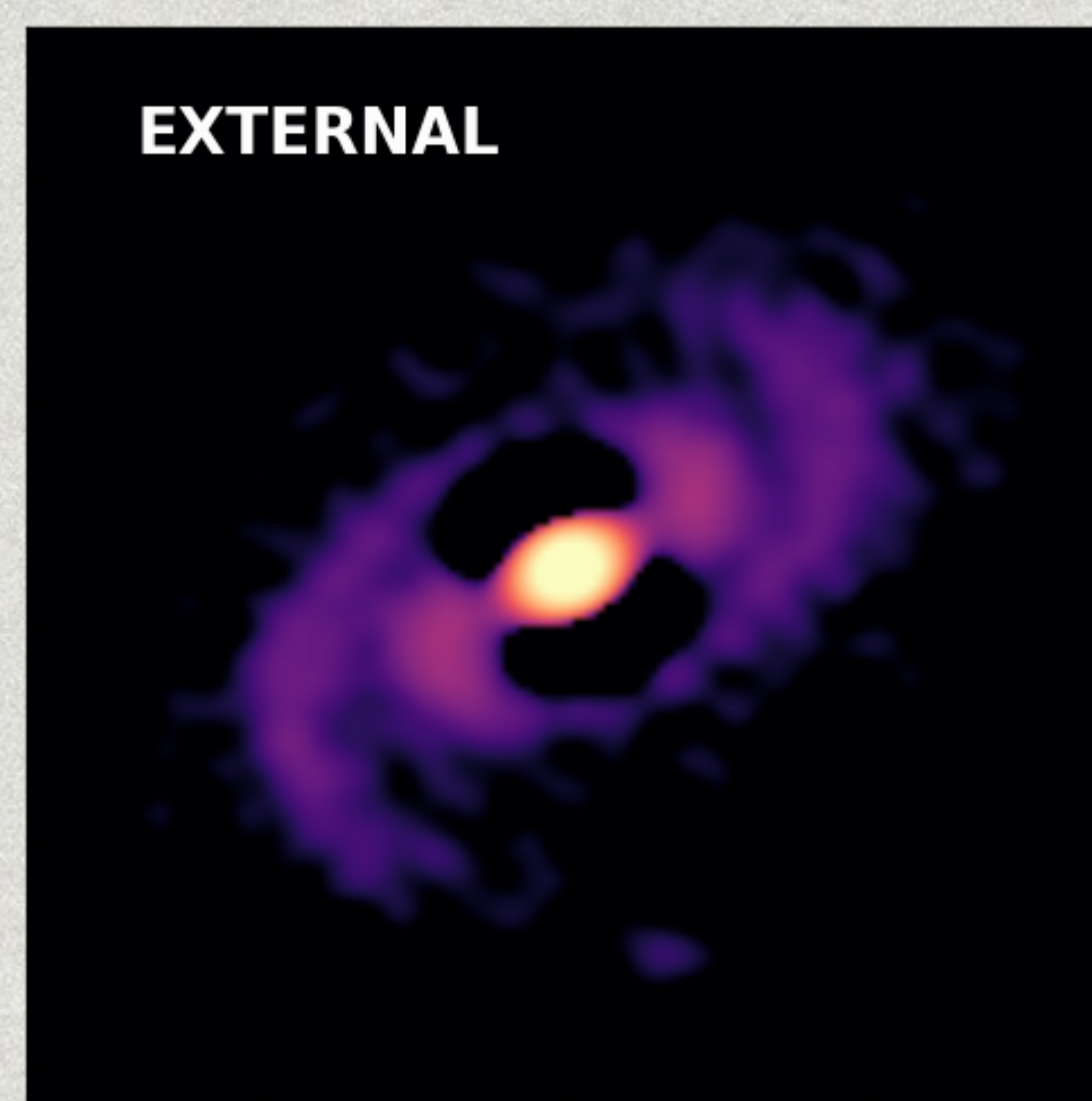
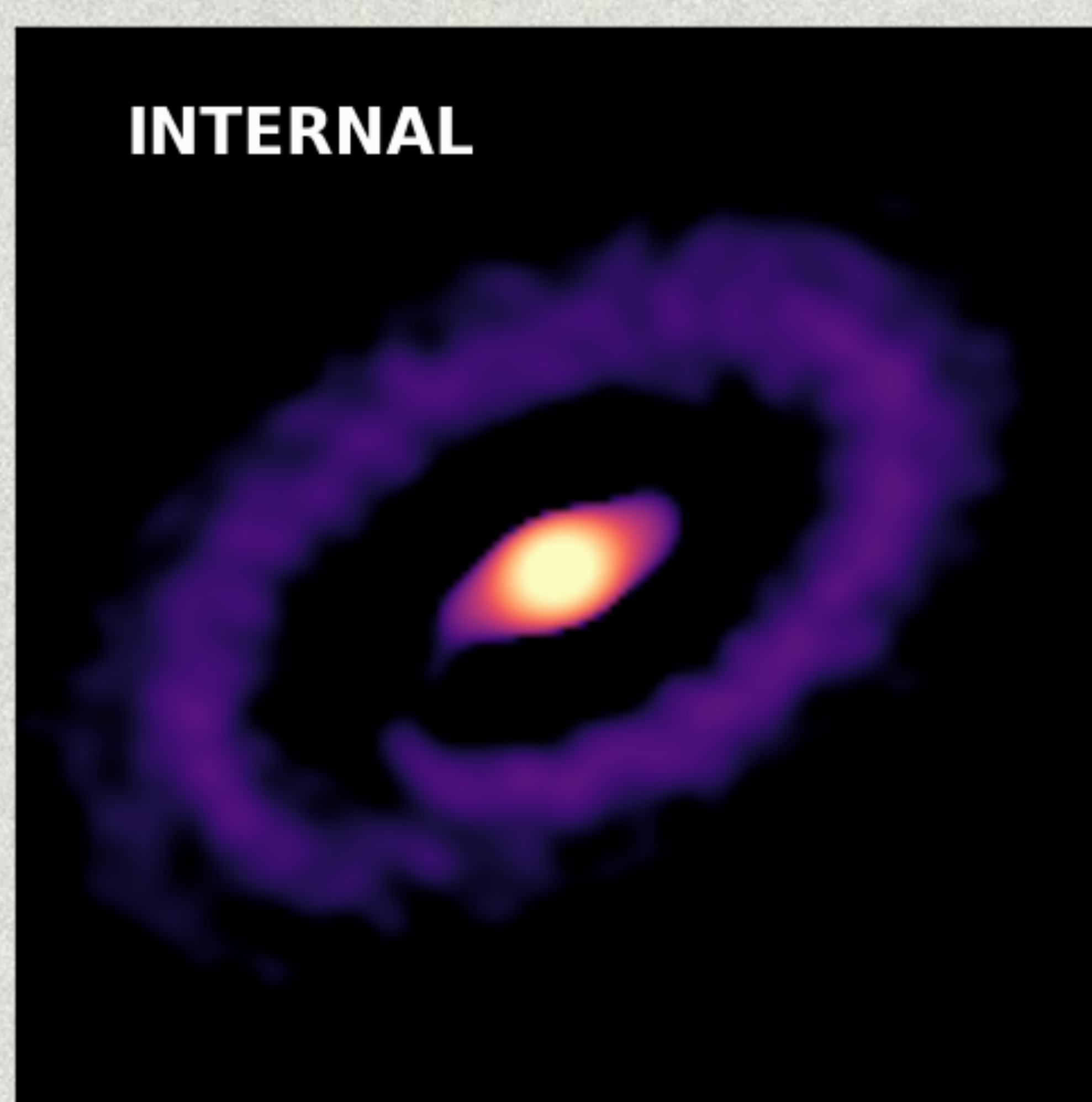
2. A companion exterior to the spirals



3. A self-gravitating disc



The above hydrodynamical simulations are processed in the same way as the observations:



CONSEQUENTLY: Elias 2-27 may be a self-gravitating disc or may have a $\approx 10-13 M_{\text{Jup}}$ companion at 300–700au
It may be one of the first observations of a self-gravitating disc or a recently fragmented disc (Meru et al 2017)

