

# Studying the properties of massive elliptical galaxy NGC 5044

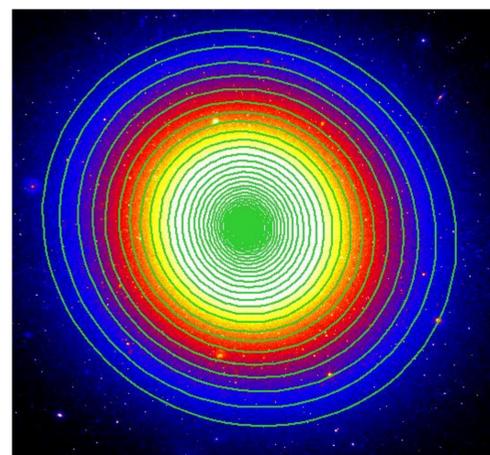
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## Introduction

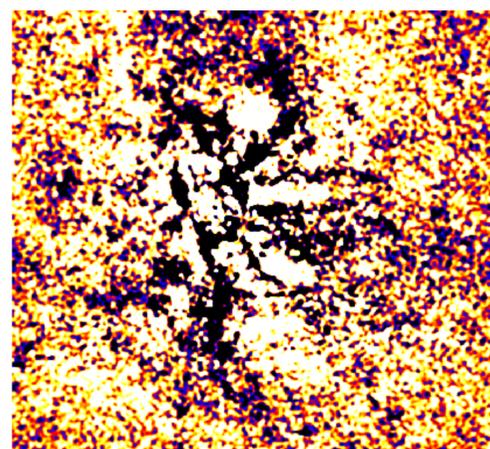
**NGC 5044** is an elliptical galaxy located at 31.2 mega-parsecs ( $\sim 10^8$  light years) away from Earth. In this study, properties of **NGC 5044** such as radial profile and dust distribution were examined based on images from Hubble Space Telescope (HST).

## Methodology

1. Magnitude per area along the radius are calculated for 3 filter bands (300 nm, 665 nm, and 814 nm), using photometry from *AstroPy*.<sup>[1]</sup>
2. Elliptical isophotes are fitted along the semi-major axis on HST F814 image, using *photutils* `fit_ellipse()` function.<sup>[2]</sup>
3. A model image of **NGC 5044** is constructed based on the isophotes. Multiprocessing is utilized to speed up this process by parallelizing the loop along the semi-major axis.
4. A residual image is created by subtracting the model image from the original image.



Elliptical isophotes of **NGC 5044** on HST F814 image



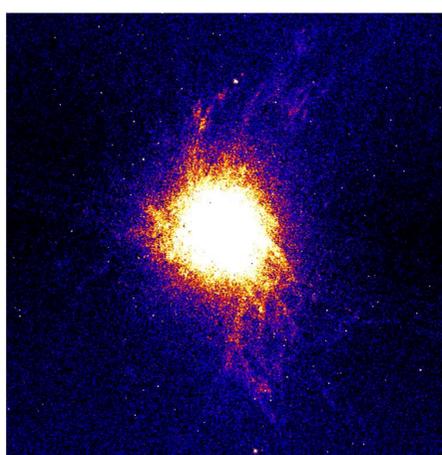
Residual image of **NGC 5044**, zooming in around the nucleus.  
Black stripes represent traces of dust.

## Key Findings

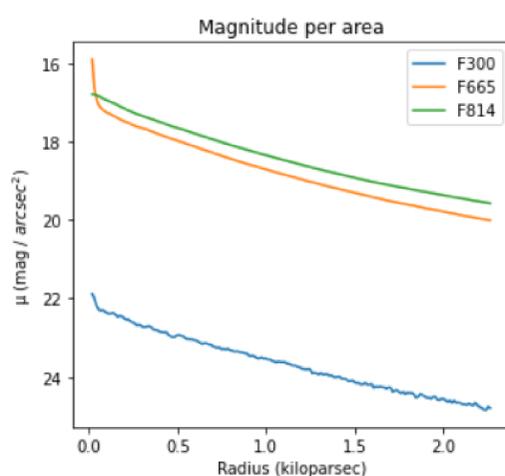
- Radial profile confirms the elliptical structure of **NGC 5044**.
- Dust is found within 15.6 arcseconds around the nucleus.

## Impact

- The study of the structure of **NGC 5044** can provide more information on galaxy formation.
- This project also helps verify and improve the code base of astronomy Python libraries.



A smoothed image from ground telescope of **NGC 5044**



Radial light profile of **NGC 5044**

## References

1. Price-Whelan, Adrian M., et al. "The Astropy project: building an open-science project and status of the v2.0 core package." *The Astronomical Journal* 156.3 (2018): 123.
2. Larry Bradley, et al. *Astropy/photutils*: 1.1.0. 1.1.0, Zenodo, 20 Mar. 2021, p., doi:10.5281/zenodo.4624996.

## Acknowledgement

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