



# EDGES: Radial Star Formation Histories of NGC4143 and UGC07639

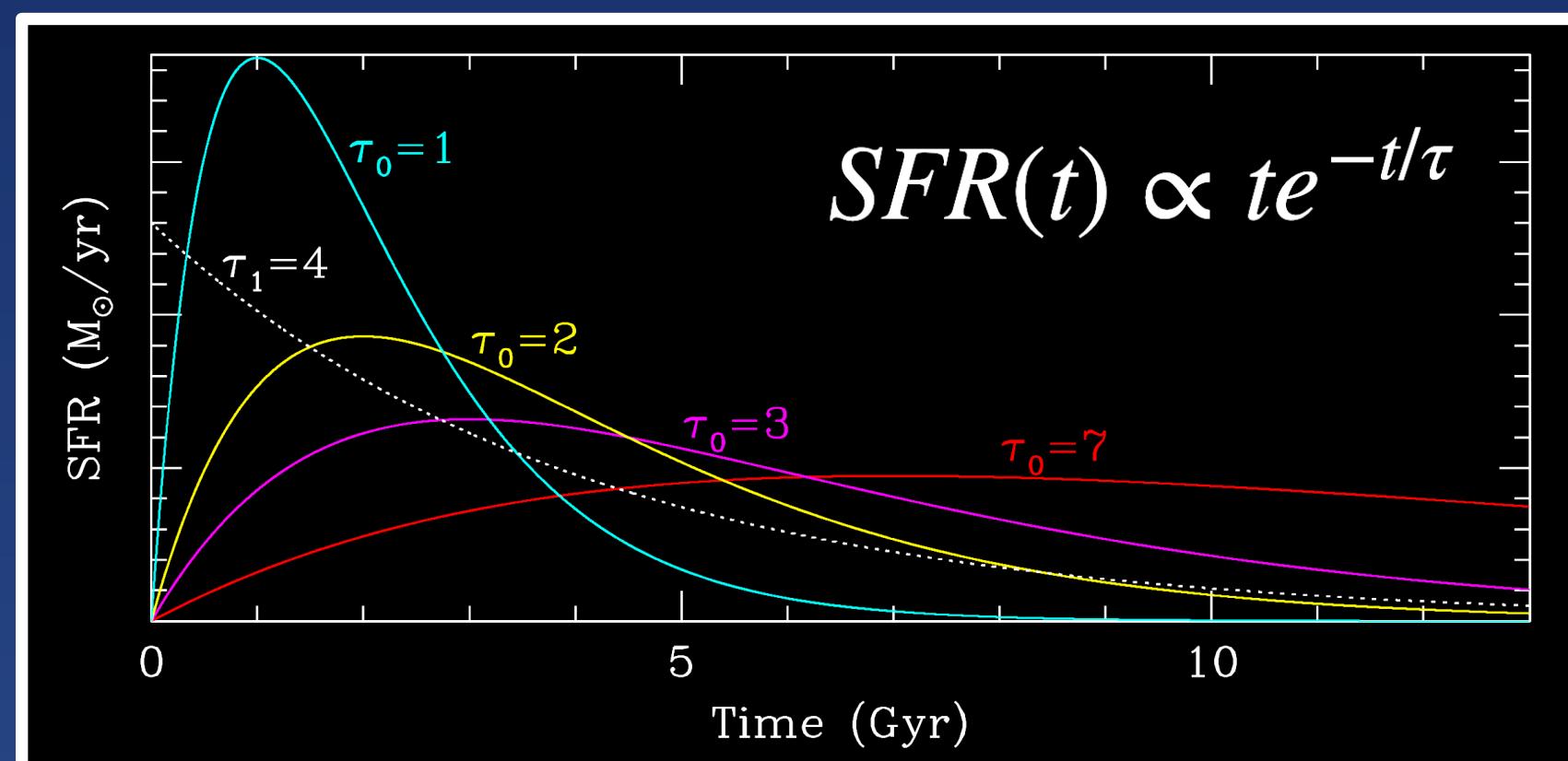


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## BACKGROUND

New deep  $u$ ,  $g$ , and  $r$  imaging was obtained on the Wyoming Infrared Observatory 2.3 meter telescope for NGC4143 and UGC07639, two galaxies in the Extended Disk Galaxy Evolution Science survey (EDGES).

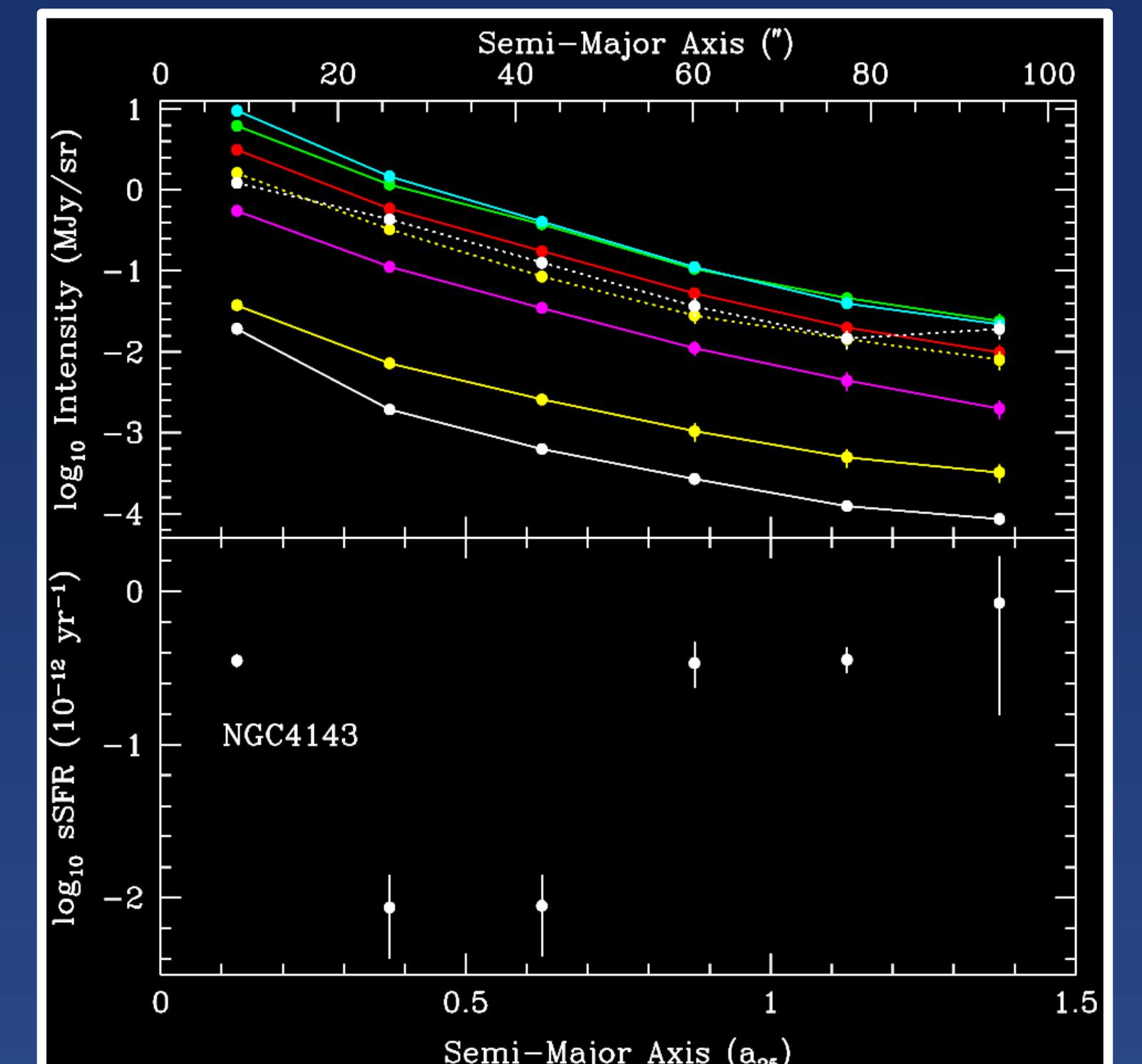
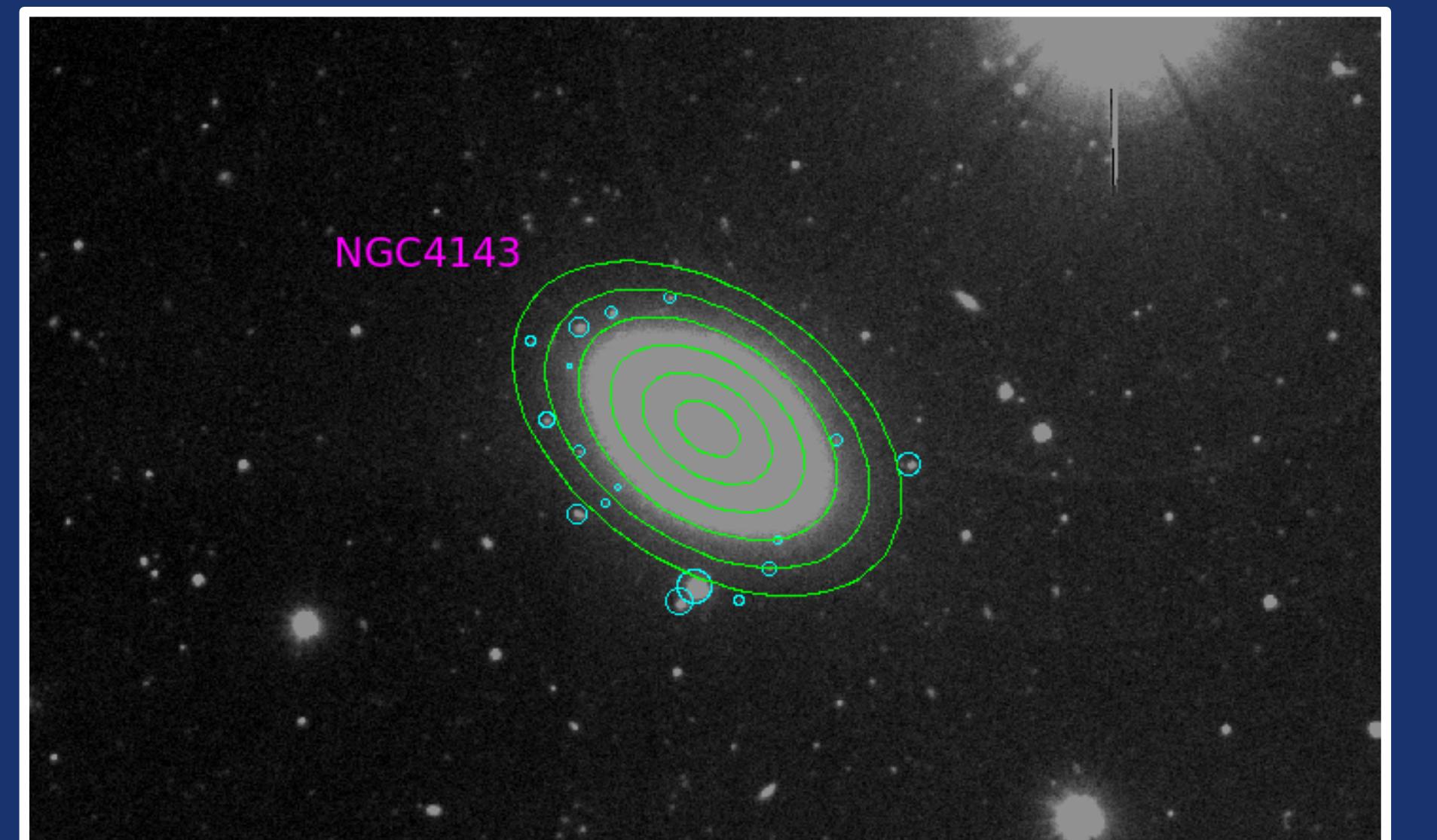
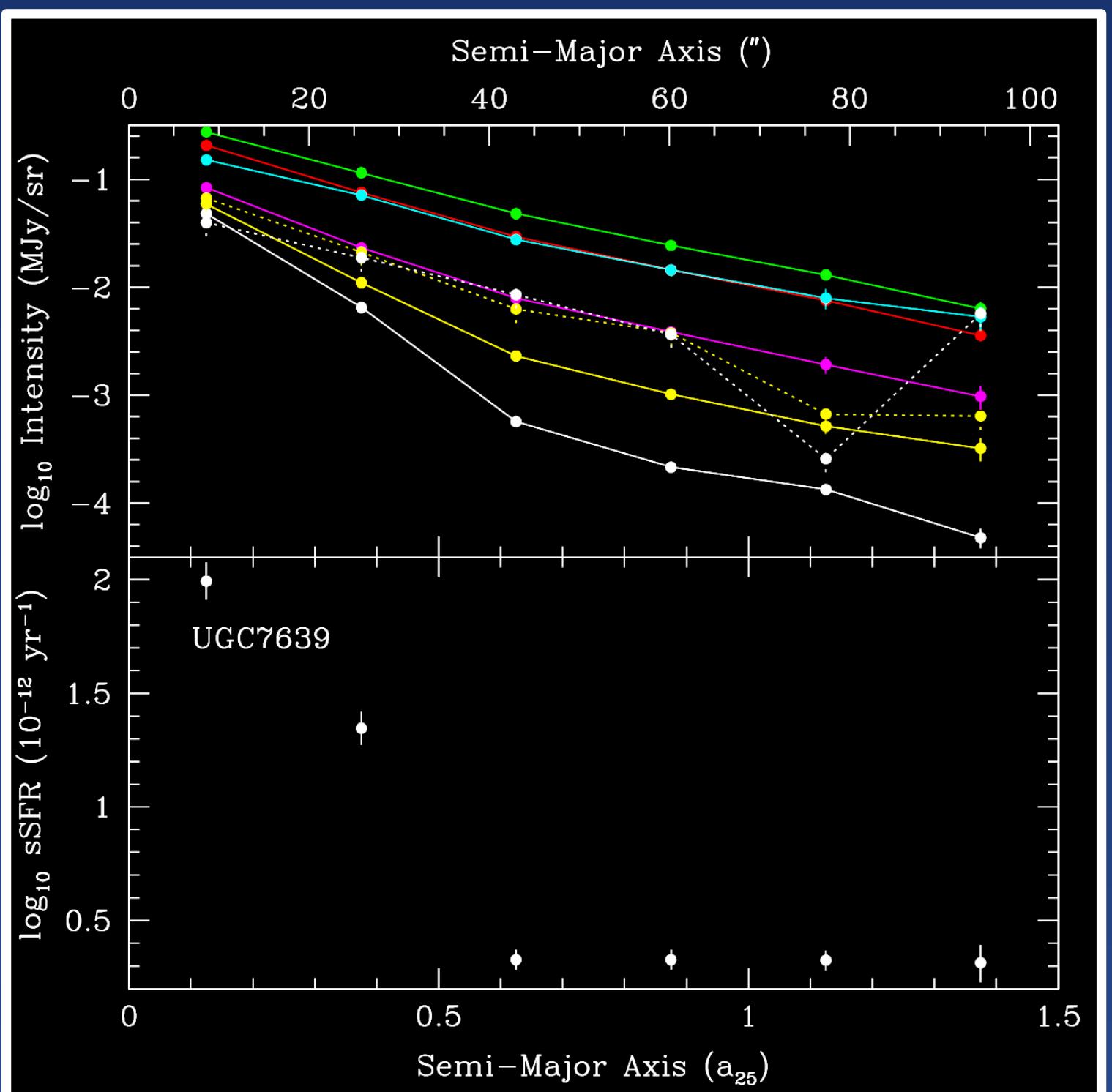
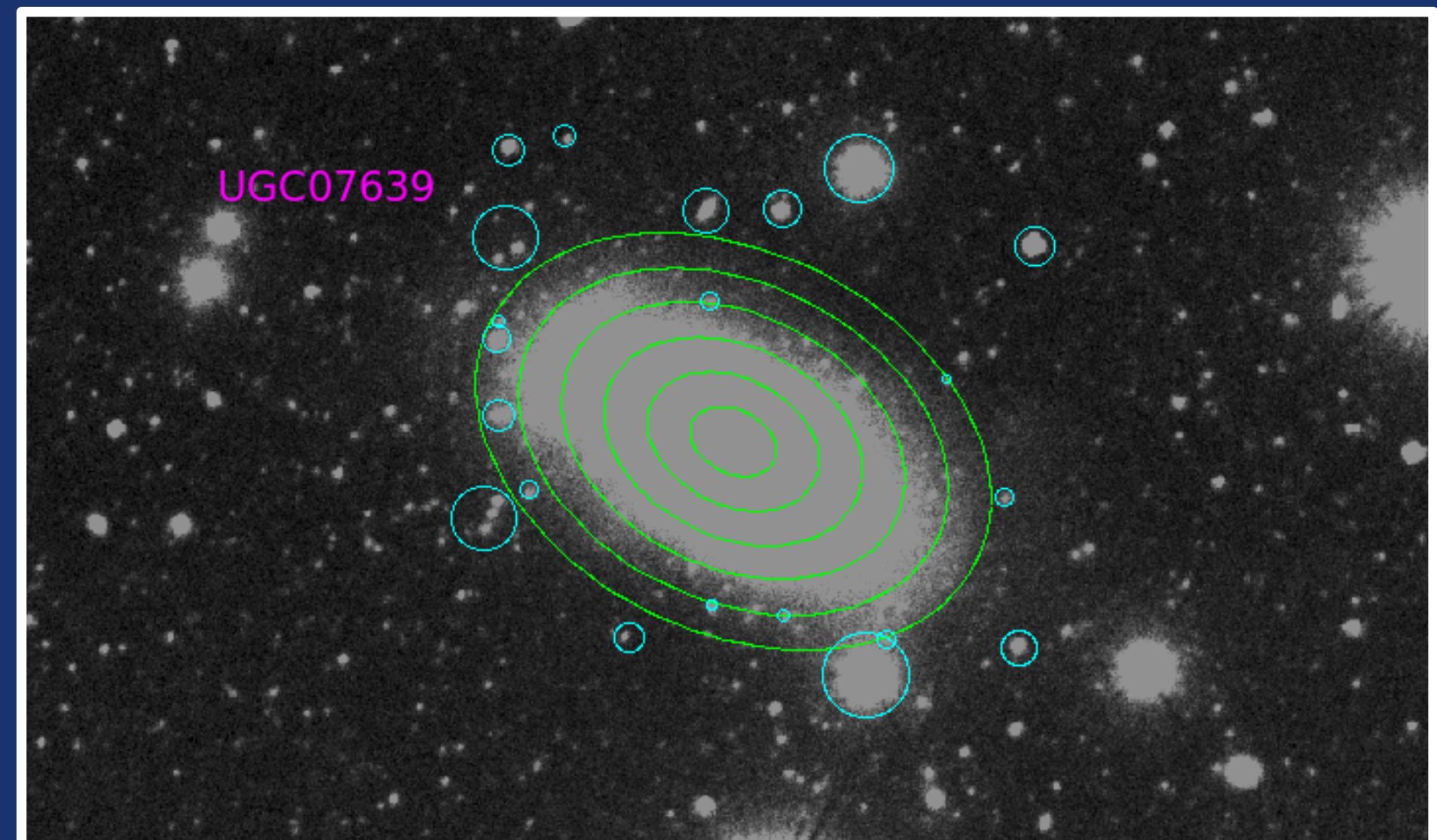
These data are coupled with deep GALEX ultraviolet and Spitzer/WISE infrared imaging to study the radial variations in the spectral energy distributions.



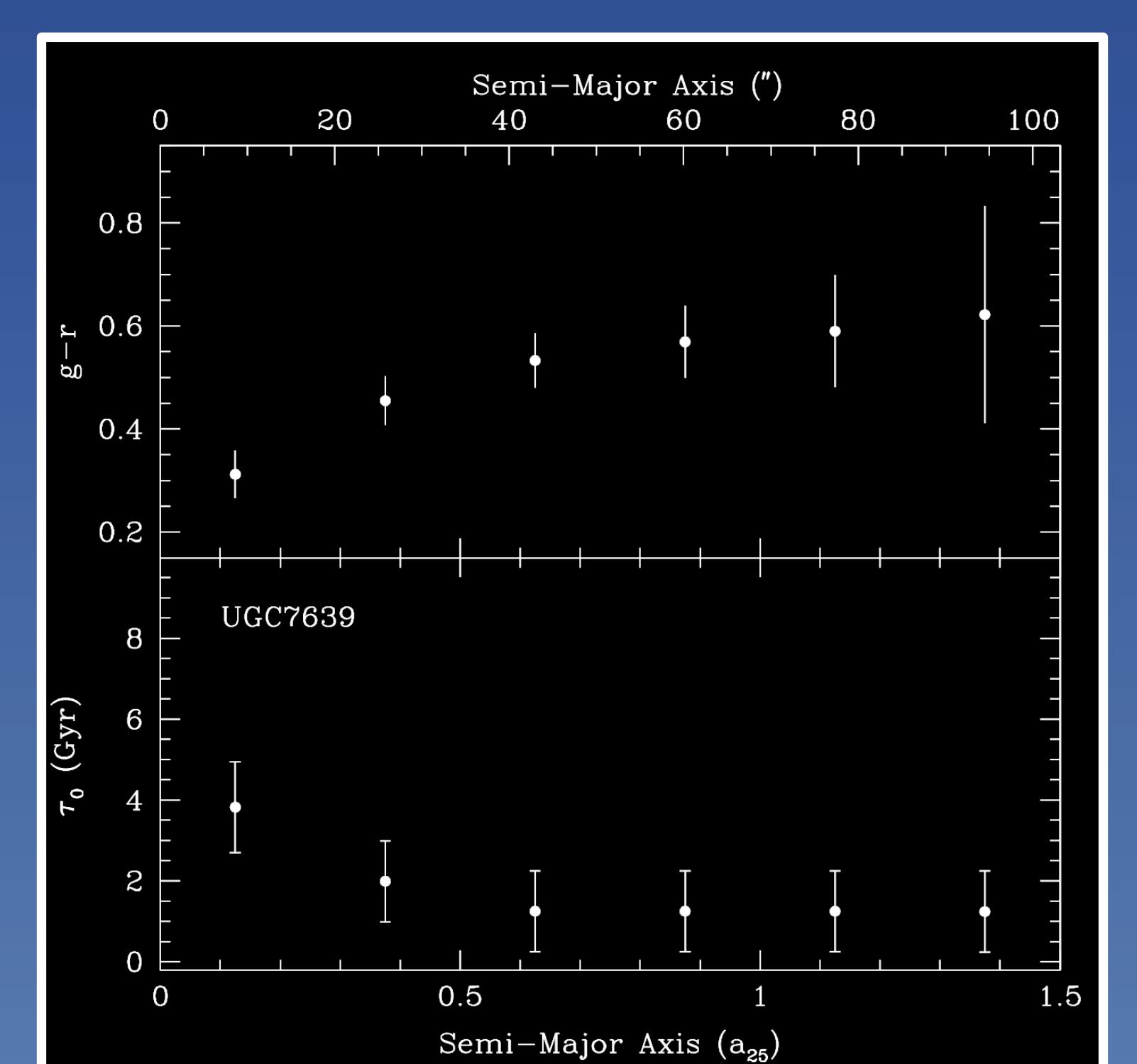
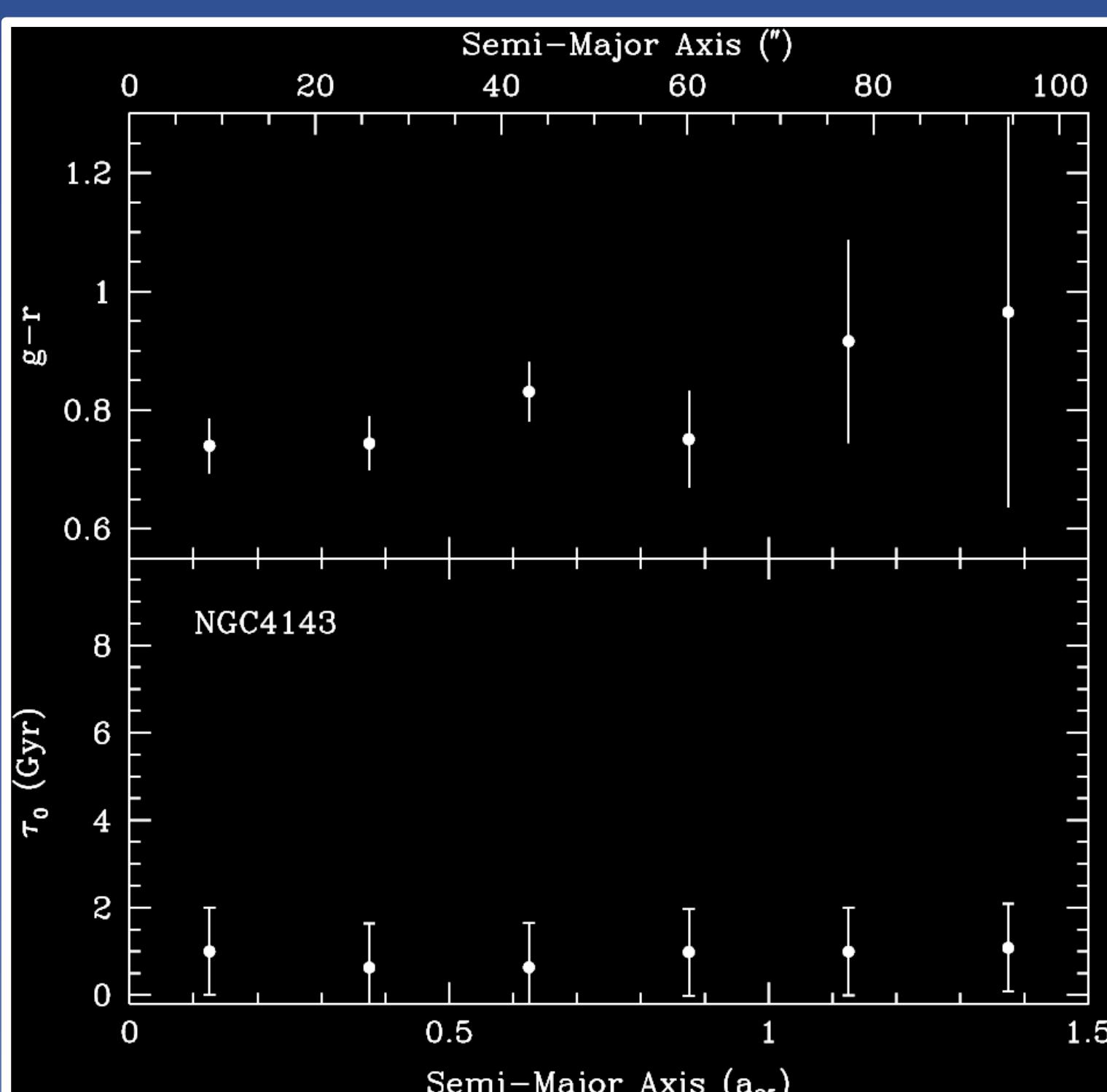
## METHODS

Imaging was done at the Wyoming Infrared Observatory (WIRO) in  $u'$ ,  $g'$ , and  $r'$  filters and was processed using standard procedures. These data were added into a set with deep

GALEX ultraviolet and Spitzer infrared imaging. Measurements of the galaxy's profile were obtained by fitting ellipses at various radii and using IRAF. The CIGALE SED fitting software was then used to study radial spectral energy distributions and star formation histories of NGC4143 and UGC07369. The image above displays how a delayed star formation history model evolves over time, for various values of  $\tau$ .

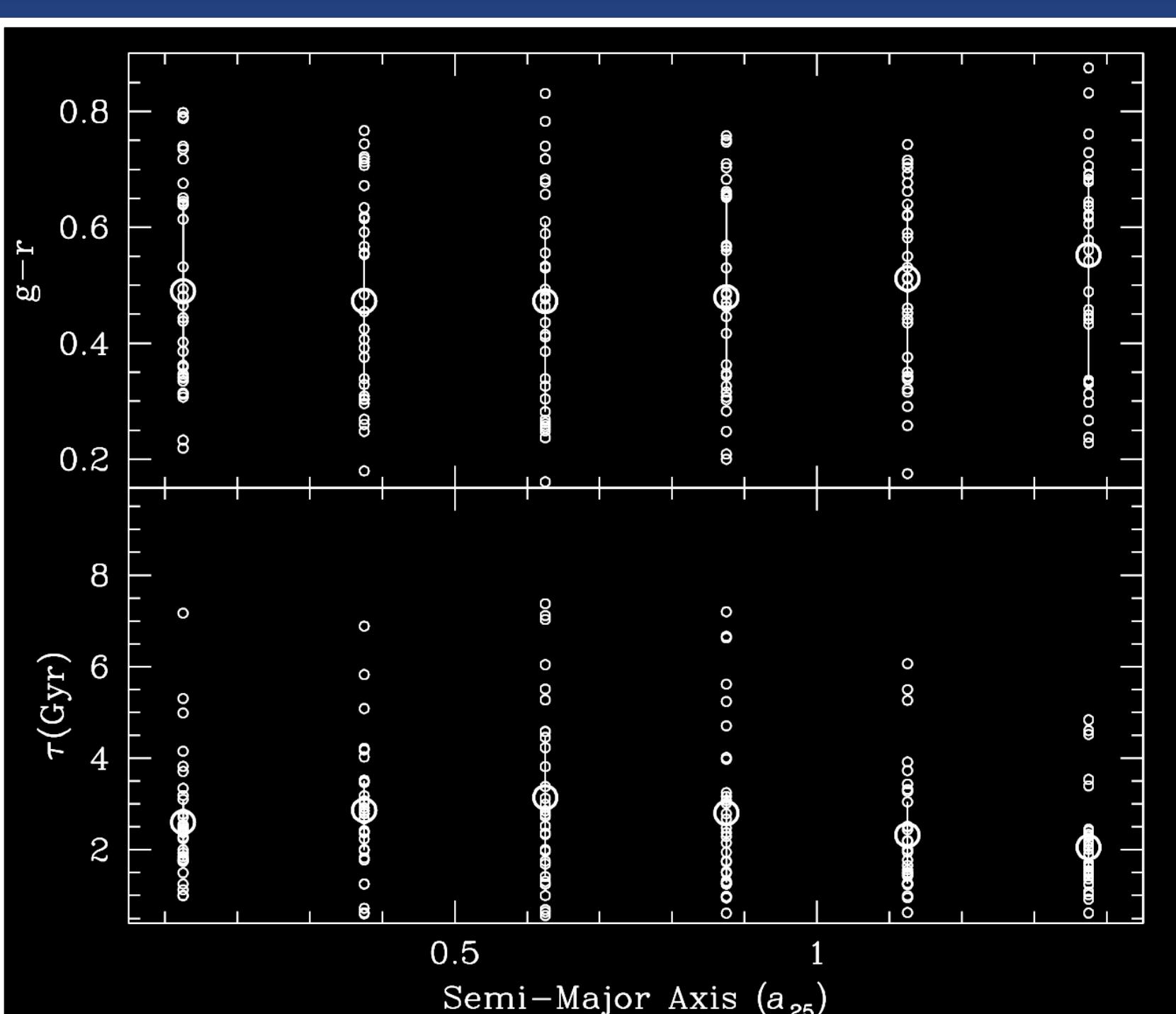


The plots above are the surface brightness profiles (top) and specific star formation rates (bottom) as functions of radius for UGC07639 (left) and NGC4143 (right). The surface brightness profiles are in several filters – 3.6 micron in cyan,  $r'$  in green,  $g'$  in red, 12 micron in yellow-dotted, 24 micron in white-dotted,  $u'$  in magenta, NUV in yellow, and FUV in black. The specific star formation rates (star formation rate per unit mass) help us characterize very active star forming regions (high values) and less active star forming regions (low values).



## RESULTS

The plot below is the sample-wide  $g-r$  and characteristic epoch of star formation ( $\tau$ ) values. NGC4143 and UGC07639 are part of a larger sample of 32 galaxies studied by the 2014 and 2018 University of Wyoming REU students. The larger circles are ensemble averages, and the bars represent the 25<sup>th</sup> and 75<sup>th</sup> percentile ranges. The  $g-r$  plot (top) shows the color of galaxies at various radii, and the  $\tau$  graph (bottom) shows the characteristic epoch of star formation (how many years after the initial onset of star formation – lower tau values correspond to older stars).



## ACKNOWLEDGEMENTS

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Wyoming

Above are the  $g-r$  color and characteristic epoch of star formation for UGC07639 (left) and NGC4143 (right). Regions of galaxies that are older (redder) have larger  $g-r$  values, whereas younger regions (bluer) have smaller  $g-r$  values. The bottom panel is the fitted  $\tau$  value for each radius.  $\tau$  is a timescale where  $\tau = 0$  Gyr is the onset of star formation and  $\tau = 13.7$  Gyr would be today. Older epochs of star formation have smaller values for  $\tau$ , whereas younger epochs have larger values for  $\tau$ .

