Star formation efficiency in Centaurus A

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The Centaurus A was first discovered by the Scottish astronomer James Dunlop from Parramatta observatory in Australia on August 4, 1826. When observed in optical wavelengths, it looks like an elliptical galaxy with a dust band. Because of their poor dust and gas contents, ellipticals typically don't have dust bands, and their star formation rates (SFRs) are relative low. However, several researches showed that Centaurus A is a starburst galaxy, with more than 100 star forming regions identified in the galaxy's disk. The peculiar characters of this galaxy interests me to do the study.

In 1959, Maarten Schmidt introduced a simple gas-density power law, which described the relation between the observable surface densities of gas and star formation. It can be written as

$$\sum_{SFR} = A\left(\sum_{gas}\right)^{N}$$

The Schmidt law has been tested in many star forming galaxies, with the power index N within the range 1—2. After about 40 years, Robert C. Kennicutt Jr. obtained the result with the index $N = 1.4 \pm 0.15$ (1998)

$$\sum_{SFR} = (2.5 \pm 0.7) \times 10^{-4} \left(\frac{\sum_{gas}}{1 M_{\odot}/pc^2}\right)^{1.4 \pm 0.15} M_{\odot}/(yr \cdot kpc^2)$$

In this summer project, I focused on searching the Schmidt-Kennicutt law of Centaurus A. In order to get the power law, I need to check the surface densities of molecular gas and SFRs. I mainly used CASA (Common Astronomy Software Applications) and IDL (Interactive Data Language) to do the works. I obtained power law index N of Centaurus A, but it does not fall in the range of the widely accepted value. Discussions were taken in the final report. More detail studies are still needed to check the correctness of my results and speculations.