R10b Star Formation Laws at GMC Scales along the Dust Lane of the Elliptical Galaxy NGC 5128 (Centaurus A)

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We present high resolution ($\sim$1″, or $\sim$18 pc) CO(1–0) and CO(2–1) observations along the dust lane of the nearest elliptical galaxy and radio galaxy, NGC 5128 (Centaurus A), taken with the Atacama Large Millimeter/submillimeter Array (ALMA). We calculate gas mass surface densities with these two transitions at giant molecular cloud scales ($\sim$ 20 pc), and derived for the first time the Kennicutt-Schmitt star formation (SF) law using the star formation rate (SFR) surface densities obtained from Spitzer/IRAC 8 μm at a resolution of 2.4″ ($\sim$ 50 pc). We checked the correlation between the Spitzer/IRAC 8 μm and MIPS 24 μm fluxes (to the coarser resolution of 6″ for the latter) and found that they scale almost linearly. Although the SF law and depletion times are in general similar to 'normal' disk galaxies, we highlight and discuss regions that deviate from the standard relations. This is the most detailed view of the SF law within an elliptical galaxy, and also in regions close to a powerful radio jet.