Morphology and Kinematics of Molecular Gas in the Double-barred Galaxy NGC 3504

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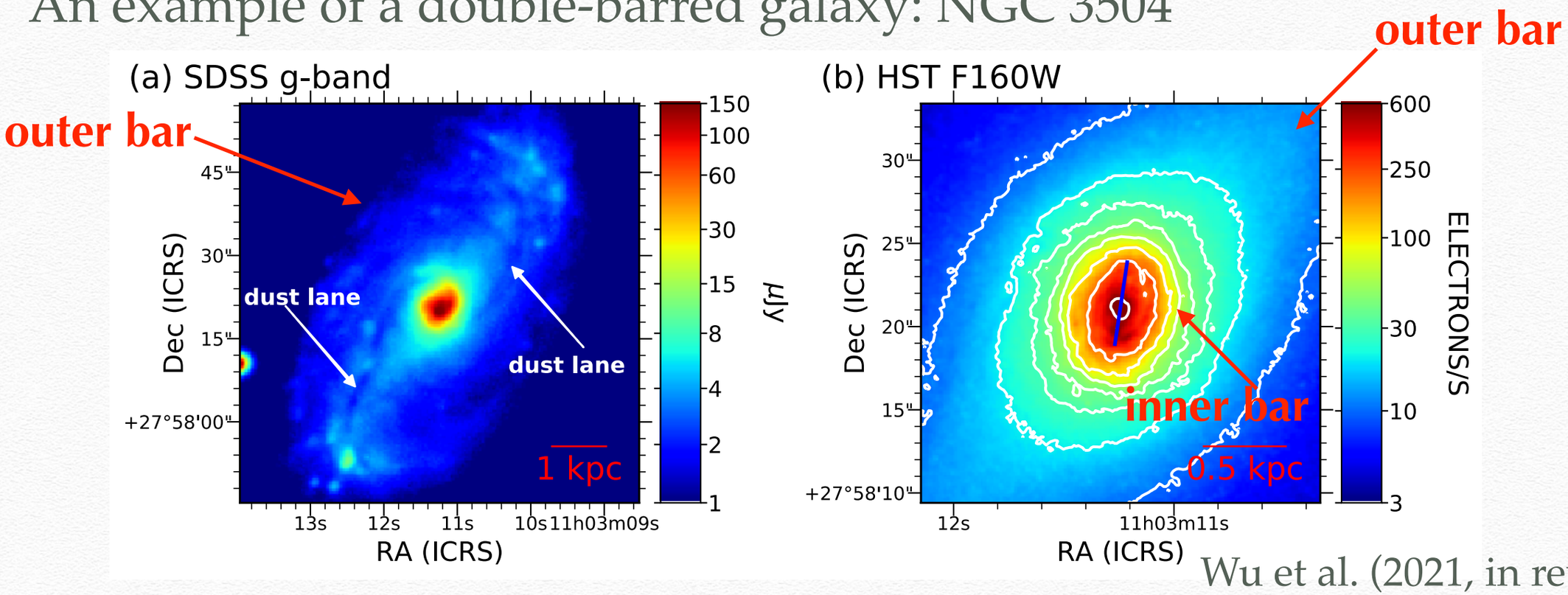
What are double-barred galaxies?

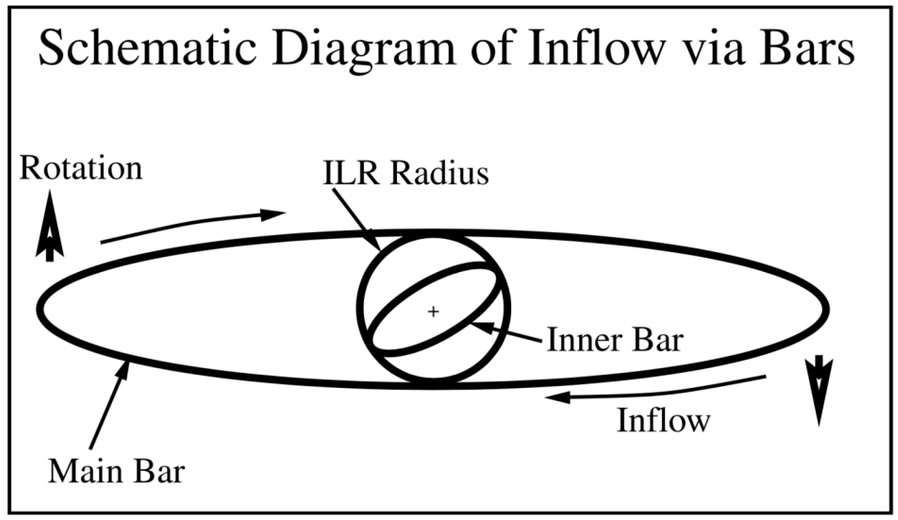
An example of a double-barred galaxy: NGC 3504



Wu et al. (2021, in revision)

Why we care about double-barred galaxies?

- ~ 30% of local barred galaxies are double-barred galaxies (Erwin & Sparke 2002; Laine et al. 2002).
- One of mechanisms to drive gas inflow to the nucleus of galaxies (Kormendy 1982; Shlosman, Frank & Begelman 1989).

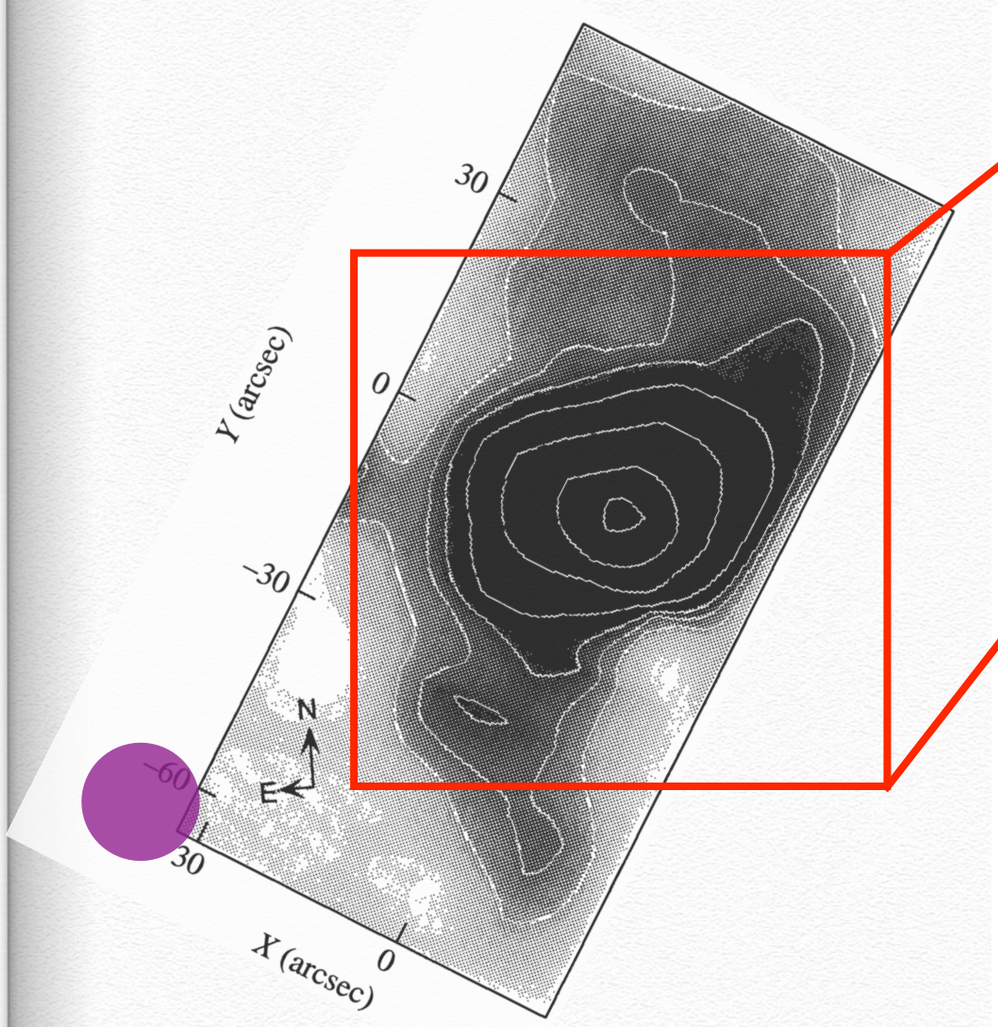


Petitpas and Wilson (2002)

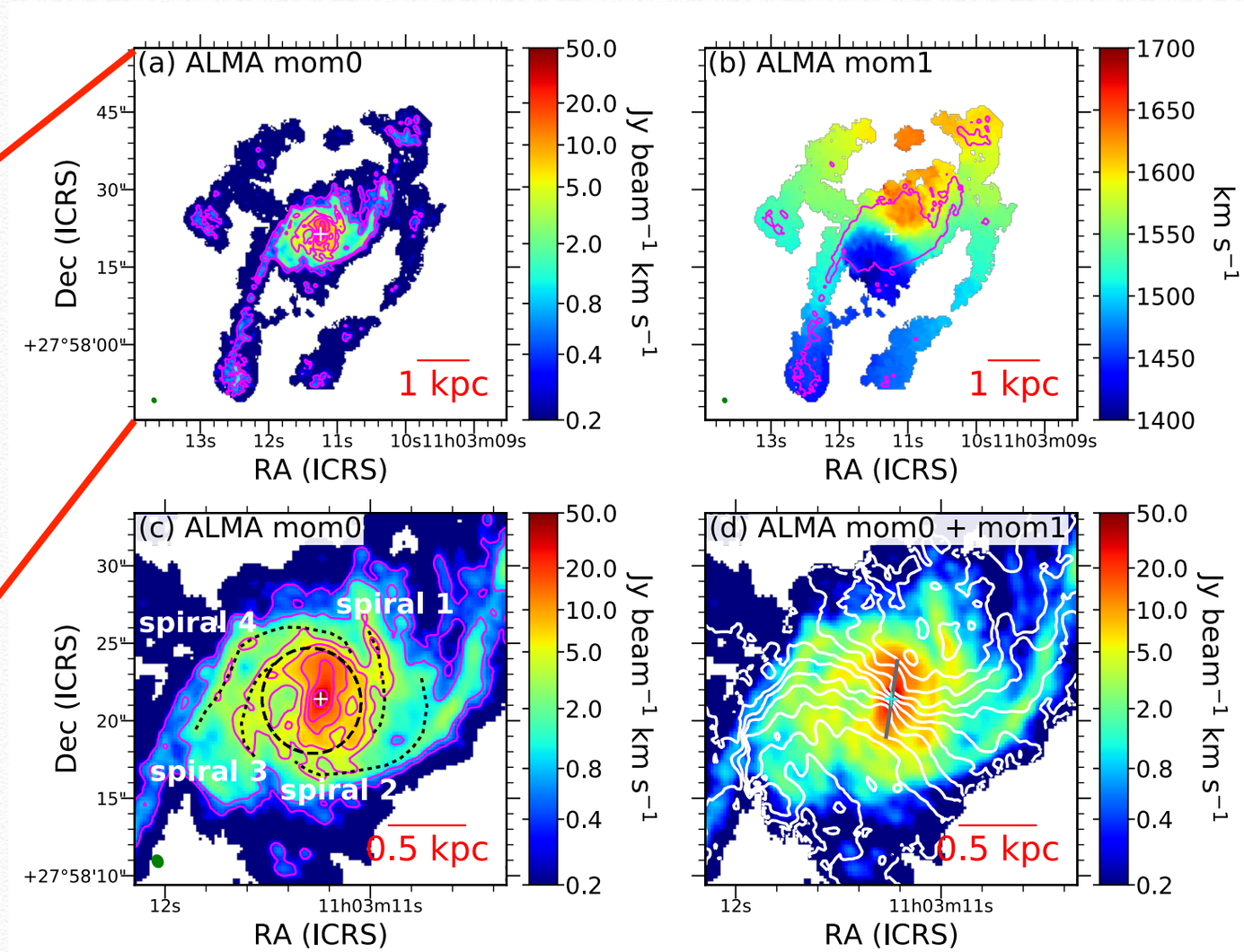
NGC 3504

- 45m telescope at Nobeyama Radio Observatory
- CO (1-0)
- HPBW=16''

- ALMA 12m + 7m
- CO (2-1)
- synthesized beam: 0″.79 x 0″.64 (PA=26 deg)



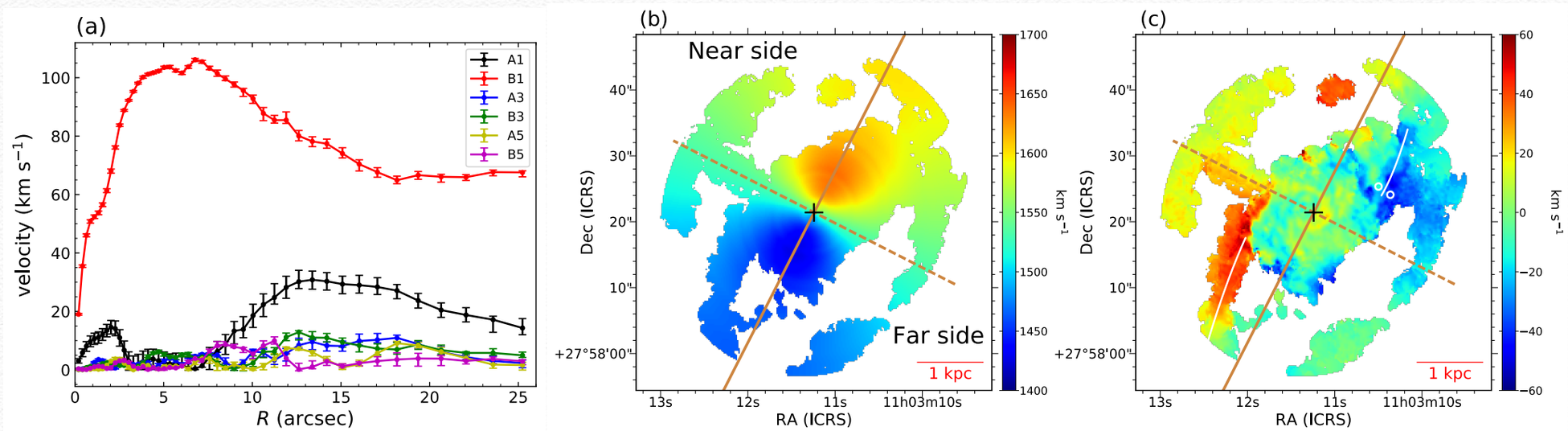
Kuno et al. (2000)



Wu et al. (2021, in revision)

Kinematic modelling

- We used *Kinemetry* (Krajnović et al. 2006) to fit the ALMA CO (2-1) velocity (moment 1) field.



Results

- Both axisymmetric and non-axisymmetric structures, including the inner molecular gas bar, the nuclear ring, and the nuclear spirals, are found in the central 1 kpc region.
- The estimated total molecular mass is about 3.1×10^9 M_{sun}, corresponding to 17 per cent of the stellar mass.
- The existence of the inner gas bar and the large amount of gas in NGC 3504 support the scenario for the formation of double-barred galaxies associated with the existence of molecular gas.