

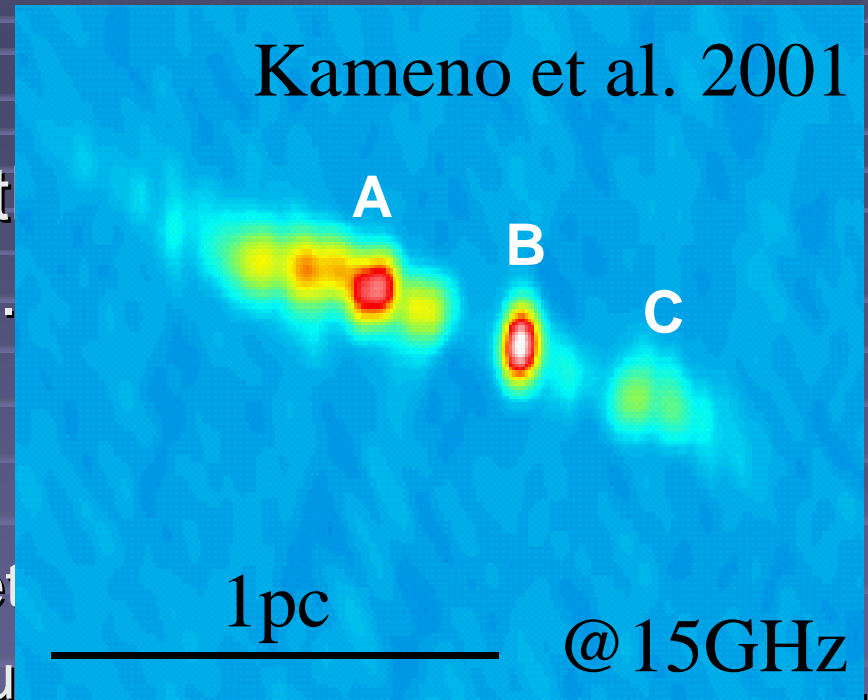
Positional coincidence between water masers and a plasma torus in NGC1052

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Introduction

...about jets of NGC1052

- Two-sided radio jets
- Proper motion between the jets
 - Apparent velocity 0.26 ± 0.01 c
(Vermeulen et al. 2003)
- Structure evolution
 - ~1999 Gap was seen between the jets
Location of the nuclear component
(Kellermann et al. 1998, Claussen et al. 1998)
 - 2000~ The nuclear component appeared.
(Kameno et al. 2001)



Introduction

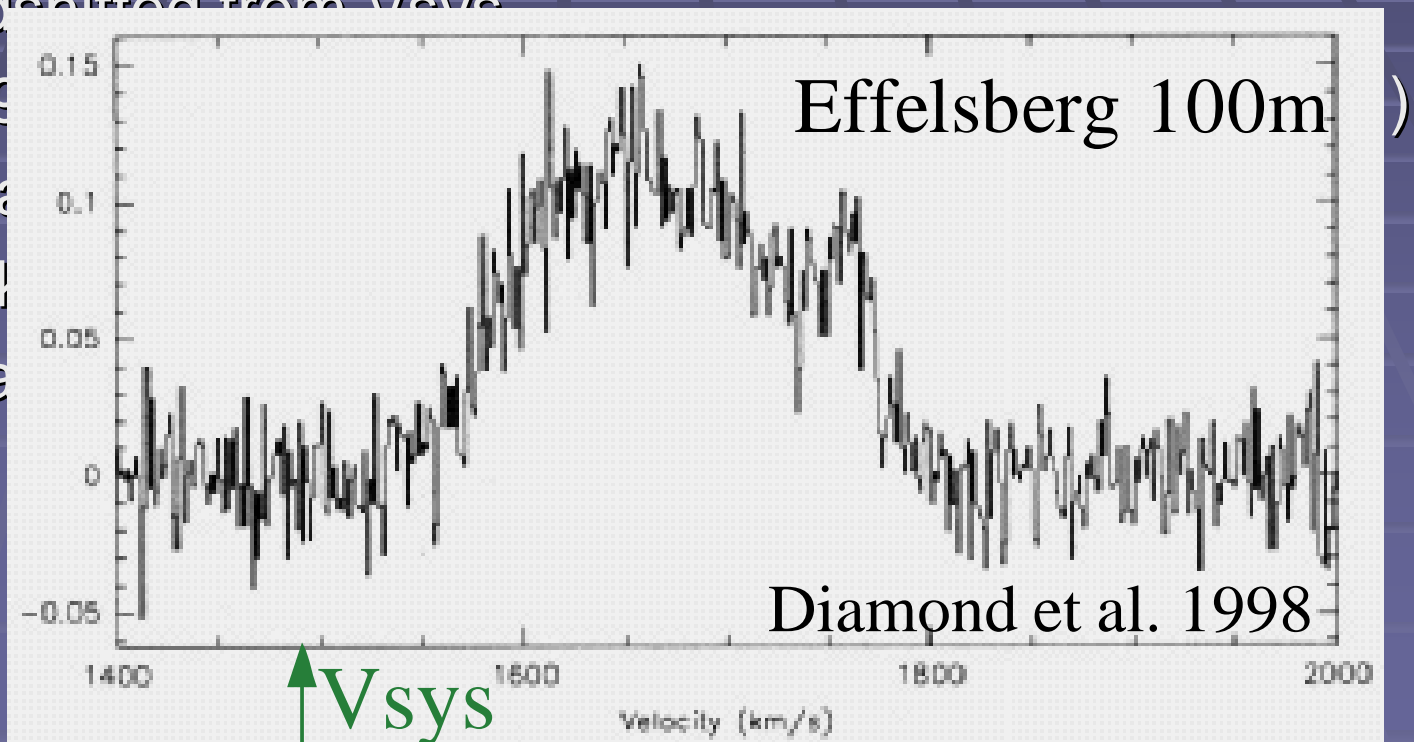
...about masers of NGC1052

- Water megamaser emissions

- Peak of its flux ~ 0.2 Jy
- Redshifted from V_{sys}

(149

- Broad
unlik
(Bra

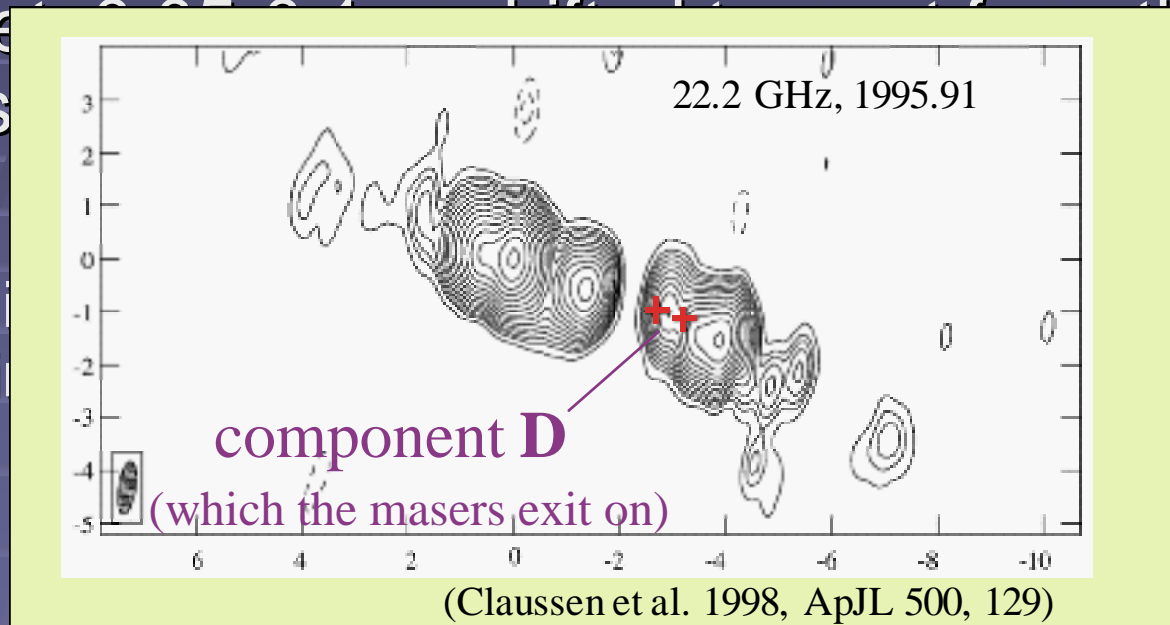


Introduction

...about masers of NGC1052

- In November 1995, masers distributed along the west jet (Clausen et al. 1998)

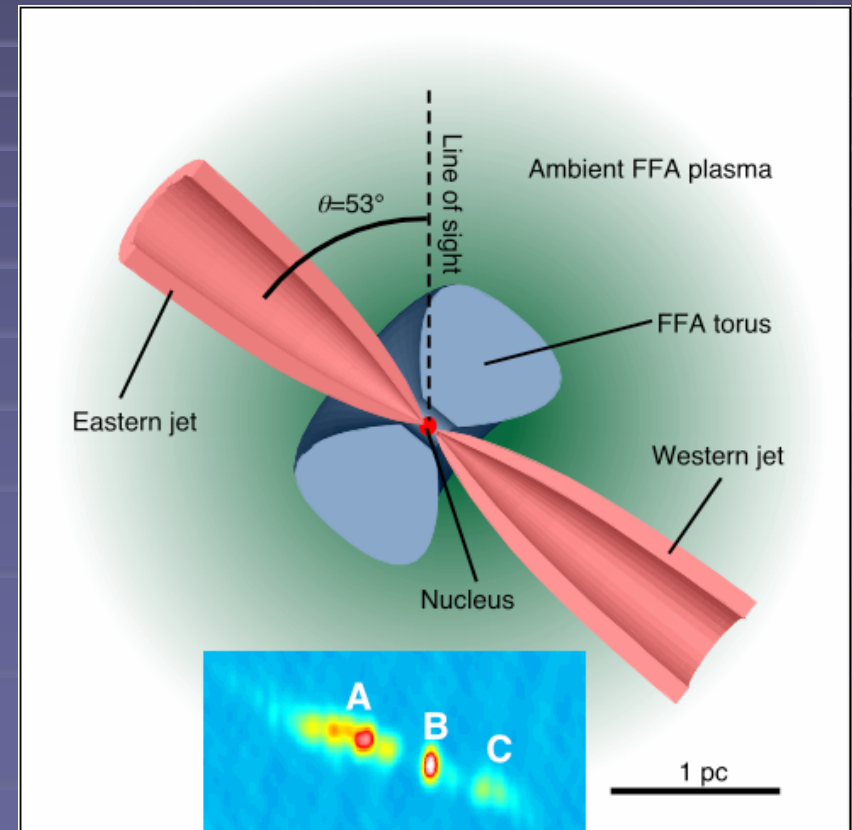
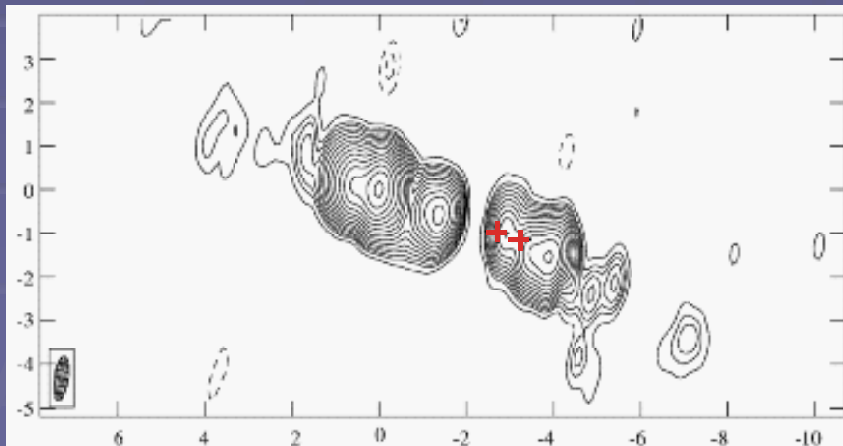
- The masers are not in the engine



+ Two groups of masers.
Observed velocity range
1585-1685 km s⁻¹

Motivation

- On the other hand, a plasma torus surrounding the nucleus is found (Kameno et al. 2001).
- So far, relation between the plasma torus and the maser gas was unknown.

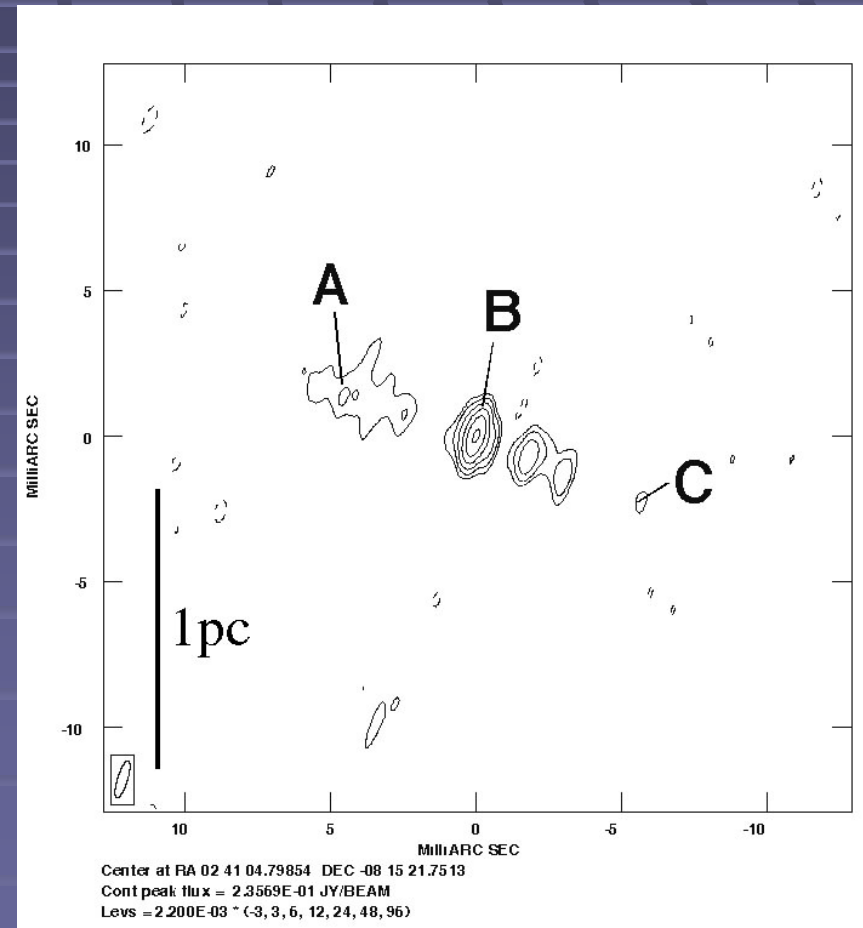


Observation

Date	24 July 2000
Used VLBI array	All VLBA antennas (longest baseline ~8000km)
Frequency	22 GHz maser and continuum emission
Reduction	NRAO AIPS
Beam size	1.0 x 0.3 mas P.A. -10 deg.

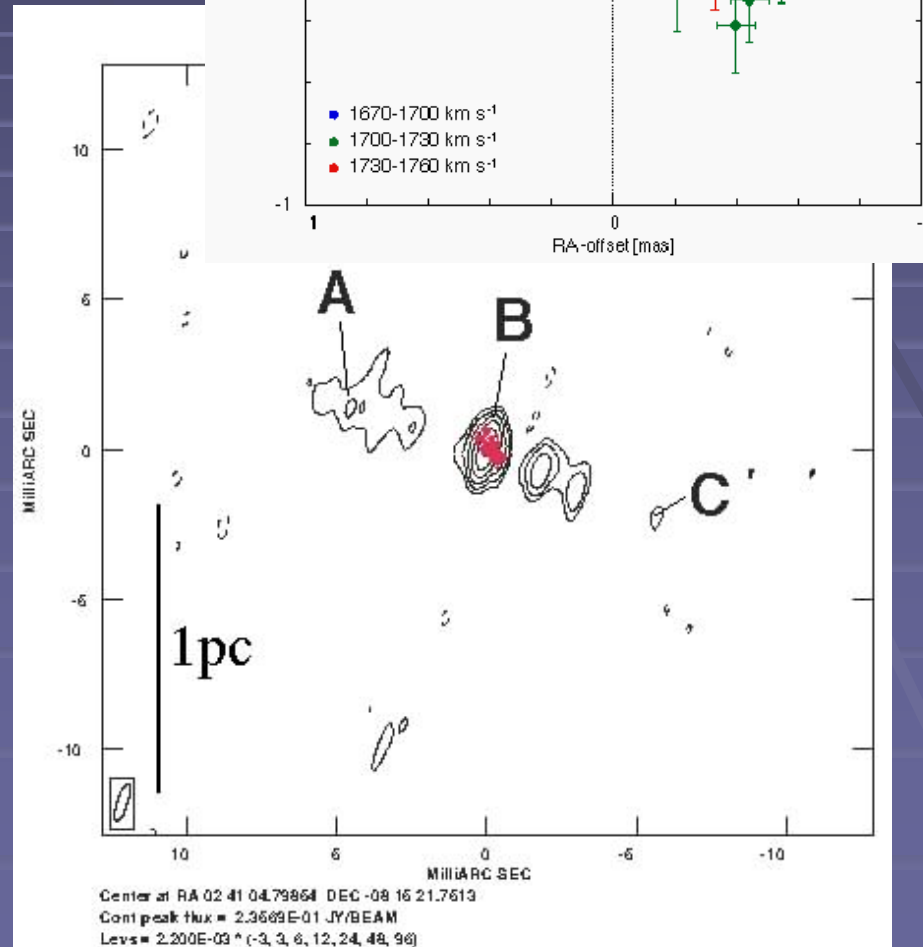
Results ... continuum structure

- Continuum structure
 - Bright nuclear component (B) and two-sided jet (A, C) are seen.
 - Similar to image of 1998 by Kameno et al.(2001)
 - Proper motion ($V_{app}=0.26c$) explains the continuum structure.
(positional separation among the components)



Result ... maser dis

- Maser gas
 - Masers (1670-1760 km/s) are detected, significantly.
 - Masers distributed within 0.1pc along the NE-SW direction.
 - The strongest maser is 0.05pc shifted to SW from the peak of the nuclear component (B).



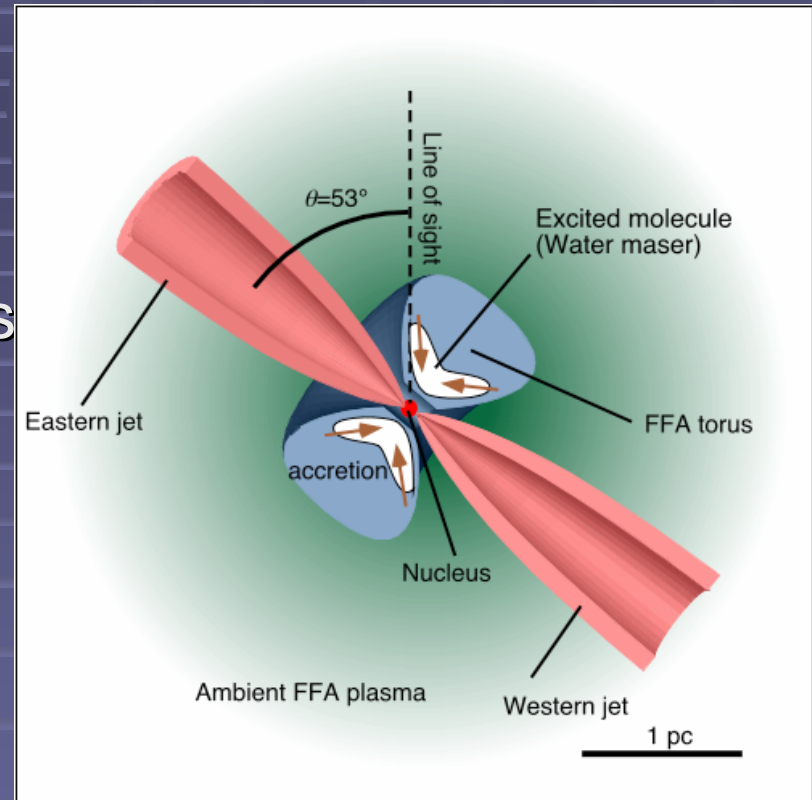
Discussion

- Both in 1995 and 2000, maser gas stayed 0.05 west of the nucleus.
- Maser gas distributed where a plasma torus covers foreground of the receding jet, especially, at the place where FFA opacity is big.
- If the component D has moved with V_{app} of $0.26c$, it should be located 0.5 pc west of the nucleus. In 2000, a faint component is detected 0.5pc west of the nucleus (component C)

The maser gas in NGC1052 could be associated
a circumnuclear torus, not jet

A possible nuclear structure

- Modified model using picture by Kameno et al. (2001)
- Excited molecular region by radiation from the nucleus exists in torus, and emits masers.
- Masers amplify the continuum emission in back ground.
- Gas in the torus is accreting on to the central engine.



This model explains

- Why on the western jet ?
- Why close to the nucleus ?
- Why stays where FFA opacity is big ?
- Why redshited from V_{sys} ?

Summary

- The continuum structure in 2000 is similar to that in 1998.
- The two images (1998 and 2000) also support the sub-luminal motion with $V_{\text{app}}=0.26c$.
- The location of maser gas relative to the nucleus is stable.
- Positional coincidence between the maser gas and the plasma torus is found.

The maser gas in NGC1052 could be explained as a circumnuclear torus