THE T TAU RADIO SOURCE

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T Tau is the paradigm of pre-main sequence solar type stars but is, perhaps, the least typical star of its class. We have made a new series of high sensitivity and resolution radio observations of the radio source associated with T Tau using the VLA. We find that at 6 cm, T Tau is a double radio source consisting of two unequal components, T Tau N and T Tau S, separated by 0".5 in the N-S direction. The intensity ratio of these two unresolved components is almost exactly 10:1 with the weaker component, T Tau N, coincident with the optical star. High sensitivity observations at 20, 2 and 1.3 cm reveal that T Tau S dominates the radio emission and has a rising spectrum. The radio spectrum of T Tau N may also be rising at radio wavelengths. We conclude that T Tau S is most likely associated with the low temperature (T = 650 K) companion of T Tau detected by infrared speckle interferometry (Dyck, Simon, and Zuckerman 1983, in press). The combination of low temperature and thermal radio emission, however, makes the nature of T Tau S very difficult to understand. T Tau N, on the other hand, is very likely to represent another example of radio emission from T Tau mass loss flows recently discussed by Cohen, Bieging and Schwartz (*Ap. J.*, 253, 707, 1982) although a revised mass loss rate of $\dot{M} = 8\times10^{-8}$ $M_\odot$ yr^{-1} is appropriate.

DISCUSSION

Appenzeller: Claude Bertout (1983, preprint) recently showed that T Tau S may be a mass accreting protostar (according to Larson's definition). The radio spectrum can be fitted by a free fall velocity field, the ionizing radiation in this case would originate in the accretion shock.

P.Schwartz: I have not seen Bertout's preprint but Hanson, Jones and Lin have a similar idea. It is important to remember that a large amount of ionization is involved -about that provided by an early B star.

Kuhi: 1) How did you get the terminal velocity for the companion star? 2) You also said that the companion did not fit anyone's models on the HR diagram? You do not have an effective temperature.

P.Schwartz: I assumed that the terminal velocity of T Tau (S) is the same as T Tau. The luminosity, $\lesssim 4 - 5\ L_\odot$, and ionization, about that produced by an early B star, in some sense define a region of the HR diagram. Unfortunately, there are not any stars in this region. Of course, I am assuming that the ionization is radiative. If collisional ionization is important, all bets are off.

Herbig: Do you attach any significance to the fact that the offset of the IR companion/radio source from T Tauri is in about the same direction as the major axis of Burnham's Nebula,

P.Schwartz: The separation of T Tau (N) and (S) is only 0".5 while Burnham's Nebula extends much further south but, obviously, the alignment is very suggestive.

Franco: The model of Hartmann and McGregor (*Ap.J.*, 259, 180, 1982) for protostellar rotationally driven winds can produce mass losses $\dot{M} \sim 10^{-5} - 10^{-6}$ $M_\odot$ yr^{-1} for low-mass protostars.