

# Binary Stars in the Orion Nebula Cluster

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If you want to talk to Rainer,  
look out for the mouse

## Introduction

Stellar multiplicity is very high among young low-mass stars, with companion star frequencies close to 100% for young stars in well-known nearby star-forming T associations like Taurus-Auriga. On the other hand, high binary frequencies are *not* observed among low-mass stars in stellar clusters like the Orion Nebula Cluster.

## Theories

- Bonnell & Kroupa (1998): Binaries are destroyed in close encounters with other stars
- Durisen & Sterzik (1994): The formation rate of binaries depends on the precollapse cloud conditions (e.g. temperature)

The interaction time scale depends on the stellar density, so less binaries should be destroyed in the outer parts of the cluster.

## Observations

Some 230 stars in 52 fields, located at 5 – 15 arcmin (0.7 – 2 pc) from the center. Adaptive Optics observations in the K-band, using ADONIS at the 3.6 m Telescope on La Silla and NIRC2 at the Keck Telescope on Mauna Kea.

For comparison, we use the sample by Petr (PhD thesis, 1998): 114 stars in the cluster core (< 3 arcmin or 0.4 pc from the center).

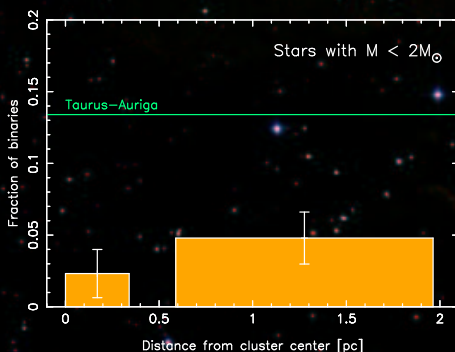
## Results

13 companions in the separation range 0.13 – 1.12 arcsec (60 – 500 AU).

We find the binary frequency of low-mass stars in the periphery of the cluster to be only slightly higher than in the core. In particular, the binary frequency in the periphery is significantly lower than in Taurus-Auriga.

A detailed report has been published in *A&A* 458, 461 (2006)

## Low-mass Stars



## Conclusions

We find no statistically significant difference of the binary frequency of low-mass stars between core and periphery.

These results do not support the hypothesis that the binary frequency in Orion was initially as high as in Taurus and later reduced by dynamical interactions, unless the Orion Nebula Cluster was much denser in the past.

## High-mass Stars

