INTRODUCTION:
RCW 34 is a star forming region located at 2.5 kpc in the constellation of Vela. Various observations will be conducted on RCW 34 in the NIR (IRSF), MIR (HERSCHEL, PACS and SPIRE) and optical (Imaging and MOG). These observations will be used to determine what fraction of the population are hot emitters, present variability, excess NIR emission, Li absorption-lines and excess blue optical colours.

All of the observations will be used in a Bayesian statistical model to construct a detailed star formation history for the region, determine the SFE, construct an IMF, determine how many members are part of multiple systems (binary or more). By knowing these properties for RCW 34 it will be possible to determine if there is something significant about it if compared to other star forming regions.

BACKGROUND:
The region, it’s exciting stars (An O8.5V and two B type stars) and a group of young cluster members located in a cleared out bubble region have been studied in depth in previous papers. There seems to be more to the region than what is given in the literature because it presents multiple epochs of star formation: (i) an associated methanol maser, (ii) the exciting stars and young young members in the bubble clearing, (iii) faint members uniformly distributed in the area surrounding RCW 34.

In a paper by van der Walt et al. (2012) it was shown that roughly 700 sources cluster above the CTT locus, in a manner that is not common for other star forming regions. Previous studies missed this part of the cluster because they were only detectable in images involving 10 000 seconds in exposure time.

COLOUR-MAGNITUDE DIAGRAM FOR THE SMALLER FIELD:
The colour-magnitude diagram for the 2012 study had an extinction of A_3.3, which had calculated by dereddening the exciting stars onto the MS. For RCW 34 it appears that there are two groups in the field, the first is the field stars - in the direction of RCW 34 which lies close to the main sequence with A_3.3. The second population has an average A_2.1, this may be due to the average visual extinction across the whole cluster.

COLOUR-MAGNITUDE DIAGRAM FOR THE LARGER FIELD:
The colour-magnitude diagram of the extended field contains many more sources than the previous deep-NIR study. This drastic increase in the number of sources may be due to lower extinction further away from the HI region.

The colours for the observed population were calibrated using 143 stars that matched between 2MASS star data and the IRSF observations, in a manner similar to the previous study. The differences between the distribution on the colour-magnitude diagram for the 7.7 μ and the 15.9 μ fields show that the calibraton from the instrumental to 2MASS system is very sensitive to colour/magnitudes. Using calibration equations dependant on extinction that were averaged to fit for the 143 stars across the whole field instead of the 7.7 μ field may be the reason why the distributions differ.

PHOTOMETRY OBSERVATIONS:
All of the observations have been conducted in 2002, 2012, 2013 and 2014 with the 1.4 m IRSF telescope using the SIMBAD camera. None of these observations makes it possible to search for short- and long duration variability (lasting hours/ days, weeks or years).

Deep imaging has been performed on an extended area around RCW 34, spanning 15.9 μ x 15.9 μ. Enabling an investigation on how far the faint, more mature PMS stars stretch out from the cluster toad.

SUMMARY:
The colour-colour and colour-magnitude diagrams show that the calibration from the instrumental IRSF magnitudes to the apparent magnitudes of the 2MASS system is very colour-dependent. This may be the reason why the groupings on the colour-colour diagram of the sources from the extended study is not identical to that from the 2012 study.

There may be many reddened classical T Tauri cluster members if one looks at the colour-colour diagram of the 15.9 μ x 15.9 μ field. The location allows many stars to be derived either onto the MS or the CTT locus.

THE FUTURE WORK:
Photometry has been performed on all the individual stars for the test of variability with a pipeline that was written in python, the analysis still needs to be conducted. By identifying field stars that are not variable the deep-NIR images can be used to construct an apparent IRSF photometric system and does not need to be dependent on 2mass calibration.

By using the MIR-PACS photometry in addition to the deep-NIR photometry a detailed extinction map can be constructed for the region. Using this map will make it possible to correctly determine how much excess emission each star emits and where it would lie in relation to the CTT locus on a NIR colour-colour diagram.

Optical photometry will be performed on the MONET/South (AAO) telescope using Sloan and H-alpha filters. This will show what fraction of the cluster members have H-alpha emission from an accretion disk. The colours from the broad-band optical photometry will also show which cluster stars have been most heavily damaged by matter shocking the PMS’s surface from the accretion disk.

MODELED OBSERVATIONS:
MOS will be performed on the sources with the H-alpha emission and the redder NIR colours. The question to determine how many of these stars present a Li absorption line.

Once all of this data has been gathered and reduced it will be possible to construct a Bayesian model. The model will be used to construct a detailed star formation history of the region, determine the IMF, SFE, and photometric function of the molecular cloud, accretion rate for some cluster members, test for binarity. It may also show what is the cause for the clustering of the 700 sources above the CTT locus in Fig. 1.

REFERENCES: