*Workshop*

## *Stellar End Products: The Low Mass - High Mass Connection*

*ESO Garching, 6-10 July, 2015*

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**Title:**
Selective photodissociation process in the carbon AGB star R Scl

**Abstract:**
We are studying selective photodissociation process in the circumstellar envelope of carbon AGB star R Scl by means of probing carbon-bearing molecules isotope ratio in the inner envelope. ALMA observation of 12CO and 13CO shows a big discrepancy between 12CO/13CO ratio in the inner part (>60) and detached shell (~19), Vlemmings et al. 2013. An unexpectedly high 12CO/13CO in the present-day mass loss compared to the photospheric 12C/13C is more likely due to selective photodissociation of 13CO which is less shielded compared to 12CO against the UV radiation field.
The H12CN/H13CN~ 5 line ratio (H12CN (J=4-3) SEST telescope data, Olofsson et al. 1996 and H13CN (J=4-3) ALMA data) is in accord with carbon photospheric ratio. Even by considering optical depth effect, it is difficult to reconcile this result with the present-day mass-loss ratio by V13.
The additional photodissociation in the inner part might be due to either a hidden binary companion or chromospheric activity. Numerous UV-spectra indicates the presence of an active chromosphere in the outer atmosphere of carbon stars (Eaton & Johnson 1988). On the other hand, the rate of binary companions of AGB stars is unknown. Mapping of other carbon-bearing molecules, as well as the photodissociation products in the inner part, lead constraining the possible hypothesises and explain the strange behaviour of 13CO isotope in the inner part of R Scl.