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Electron Temperature Fluctuation in Gaseous Nebulae

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Science with SITELLE Workshop, 11 - 14 May 2013

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Abundance discrepancy (AD) problem

The chemical abundances of heavy elements derived from recombination lines are systematically higher than those derived from collisionally excited lines.

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Electron temperature fluctuations (t^2)

Peimbert (1967) proposed the electron temperature fluctuations to explain AD problem.

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Determination of the electron temperature

The sensor used by me previously is [OIII] ($\lambda4959+\lambda5007)/\lambda4363.$

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A discrete approximation for t_s^2 , first proposed by Liu (1998), is $\sum (T^i - T_s)^2 E_s(H_s^2)$

$$f_{\rm s}^2(\rm obs) = \frac{\sum_i (I_e^2 - I_0)^2 F_i(\rm H\beta)}{T_0^2 \sum_i F_i(\rm H\beta)}$$
(1)

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$$t_{\rm s}^2(\rm obs) = \frac{\sum_i (I_e^i - I_0)^2 F_i(\rm H\beta)}{T_0^2 \sum_i F_i(\rm H\beta)} \tag{1}$$

And the final estimation of t_s^2

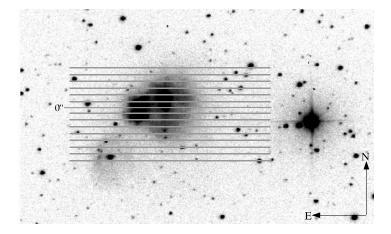
$$t_{\rm s}^2 = t_{\rm s}^2 {\rm obs} - t_{\rm errors}^2 \tag{2}$$

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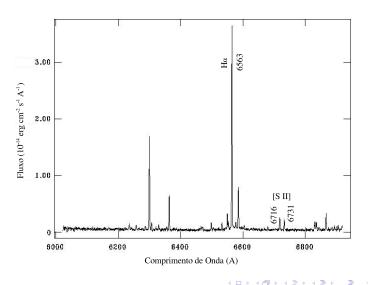
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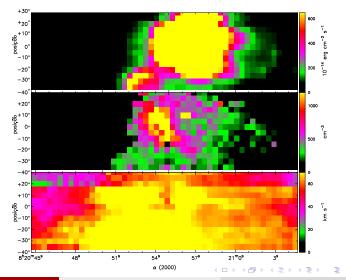
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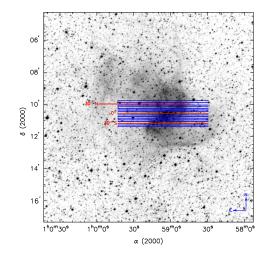
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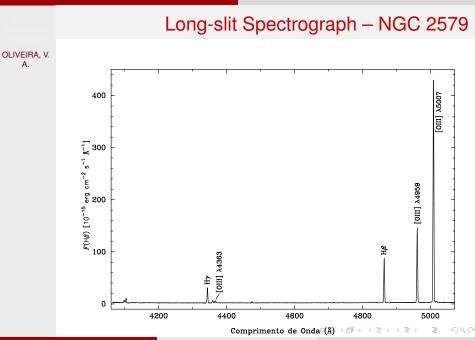
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Oliveira *et al* 2008 ^(~) May / 2013 7 / 9



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