

# Specific data analysis tools for IFUs?

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Estallidos with Integral Field Units  
IAA, 18/06/09

- 1 Specific data analysis tools
  - Automatic line identification
  - FiEstAS

2 ?

# Motivation

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**100 lines × 1000 spectra × 100 datacubes**

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**× 3.6 seconds = 10<sup>4</sup> hours**

# A simple algorithm

## Find continuum

- Smooth data
- Estimate noise

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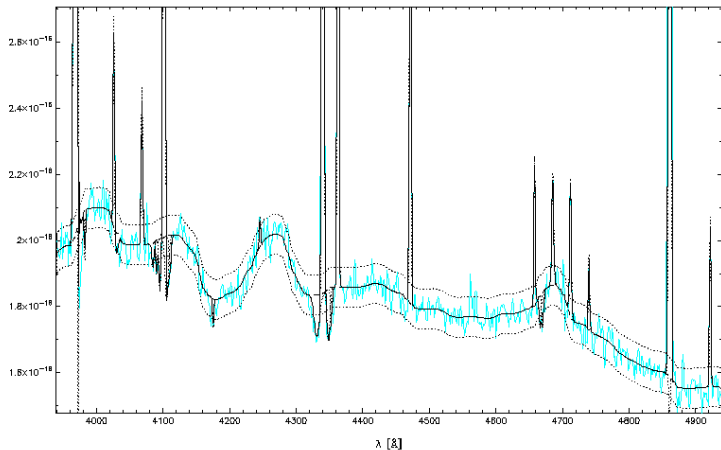
- Smooth data
- Estimate noise

## Find lines

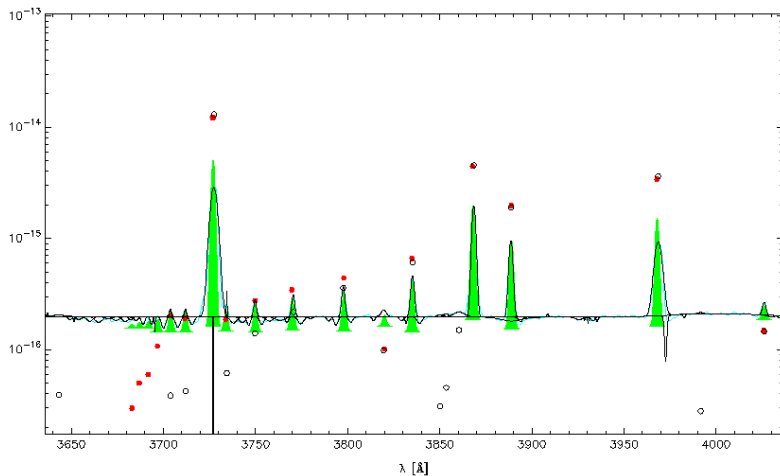
- Locate peaks
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# Results



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## Summary

- Agreement to the  $\sim 10 - 20\%$  level
- Almost always (requires human supervision)
- Room for improvement

# Field Estimator for Arbitrary Spaces

density

$$p(\mathbf{x})$$

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$\rho(\mathbf{x})$

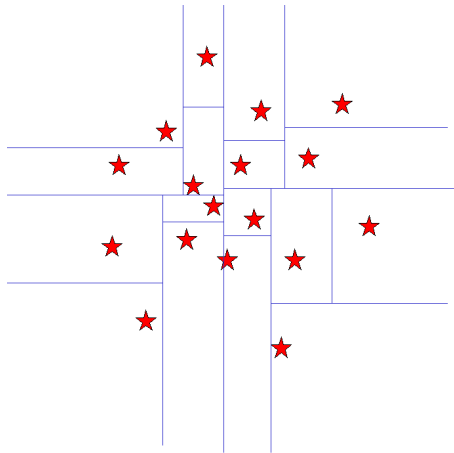
e.g. number of galaxies  
 $\text{arcsec}^{-2} \text{ mag}^{-1} \text{ kpc}^{-1}$

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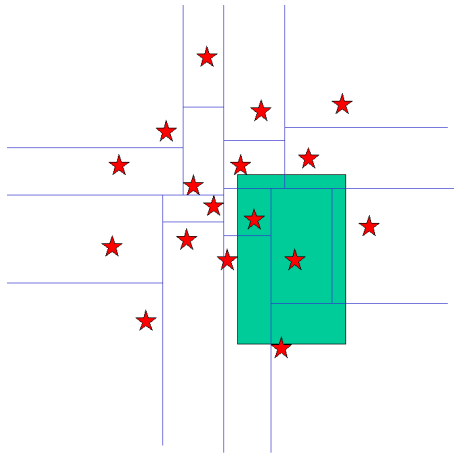


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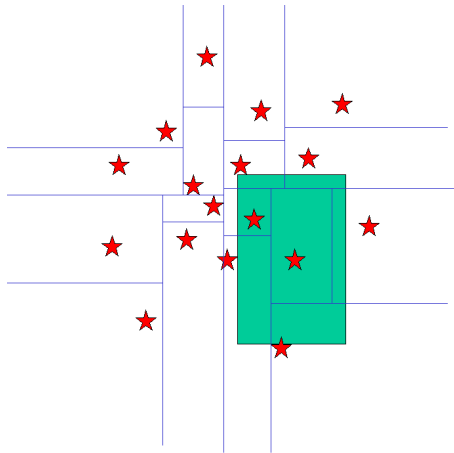


# Field Estimator for Arbitrary Spaces

(Probability) density

$$p(\mathbf{x}) \, d\mathbf{x}$$

e.g. number of galaxies  
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# Applications

## Numerical integration

- FiEstAS sampling

## Bayesian inference

- Model selection
- Parameter fitting

## Classification

- Unsupervised: find density maxima
- Supervised:  $p(a|\mathbf{x}) = \frac{\rho_a(\mathbf{x})}{\rho_a(\mathbf{x}) + \rho_b(\mathbf{x})}$   
 $p(b|\mathbf{x}) = \frac{\rho_b(\mathbf{x})}{\rho_a(\mathbf{x}) + \rho_b(\mathbf{x})}$

## Regression

$$p(z|\mathbf{x}) = \int p(\mathbf{x}, \mathbf{y}, z) d\mathbf{y}$$

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Data analysis tools for IFUs?

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- (Un)supervised classification (e.g. WR)
- Regression (e.g. metallicity)
- Bayesian inference (e.g. star formation history)
- etc.

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