Exploring the spectroscopic diversity of type Ia supernovae with DRACULA: a machine learning approach

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Goal:
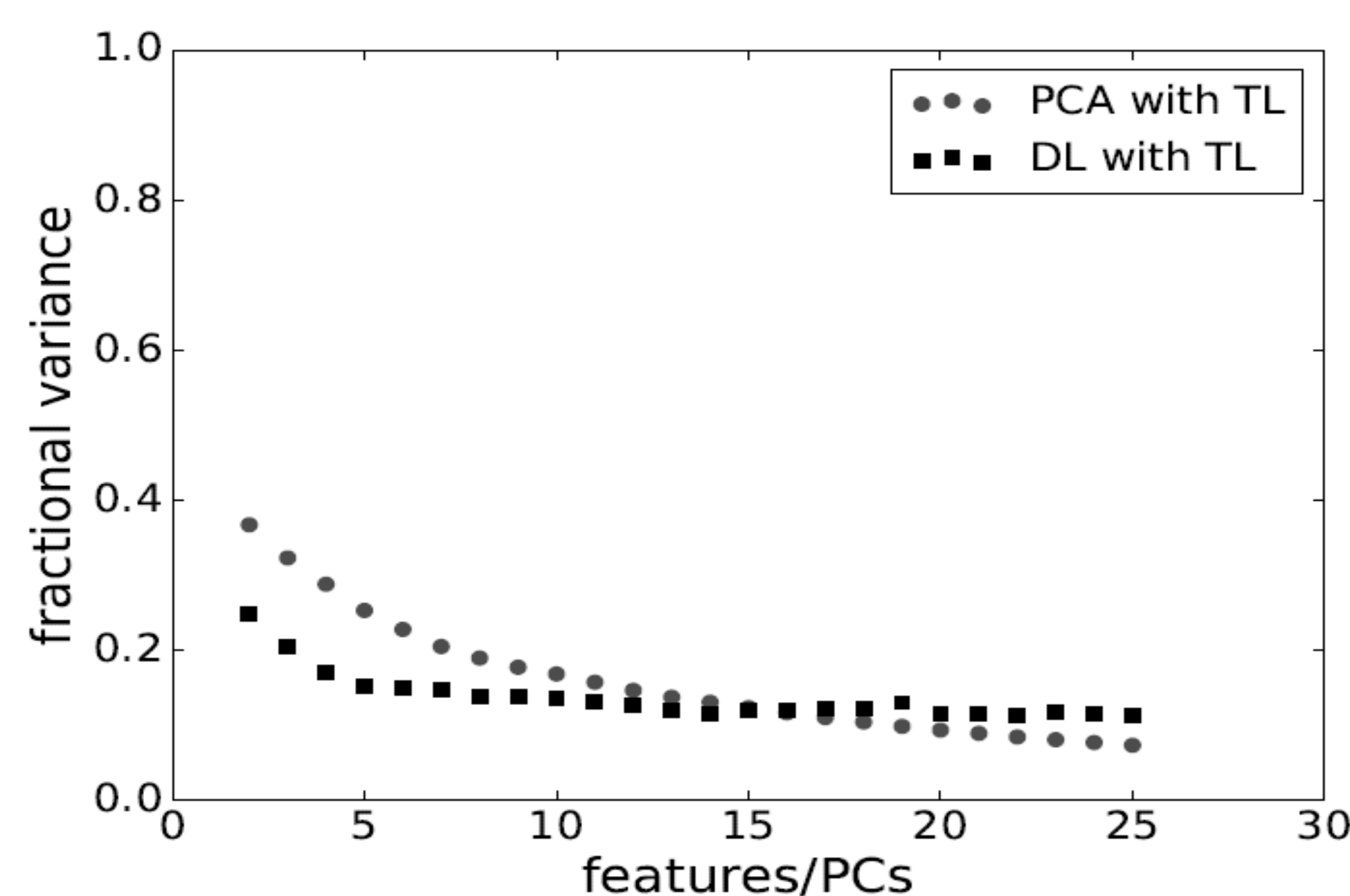Automatically identify sub-types of type Ia supernovae

Challenges:
1. Not enough spectra at maximum
2. Highly non-linear problem
3. Validation of unsupervised clustering

Strategies:
1. Transfer Learning
2. Deep Learning
3. Compare with human classification

1. Transfer Learning

- Use spectra in *all epochs* to perform the dimensionality reduction.

- Afterwards, separate spectra at maximum for subsequent analysis

2. Deep Learning for dimensionality reduction

Layers= (120,100,90,50,30,20,4,20,30,50,90,100,120)

3. Comparison with human class.

Final remarks
We were able to automatically identify groups which are very similar to the ones found in the literature.
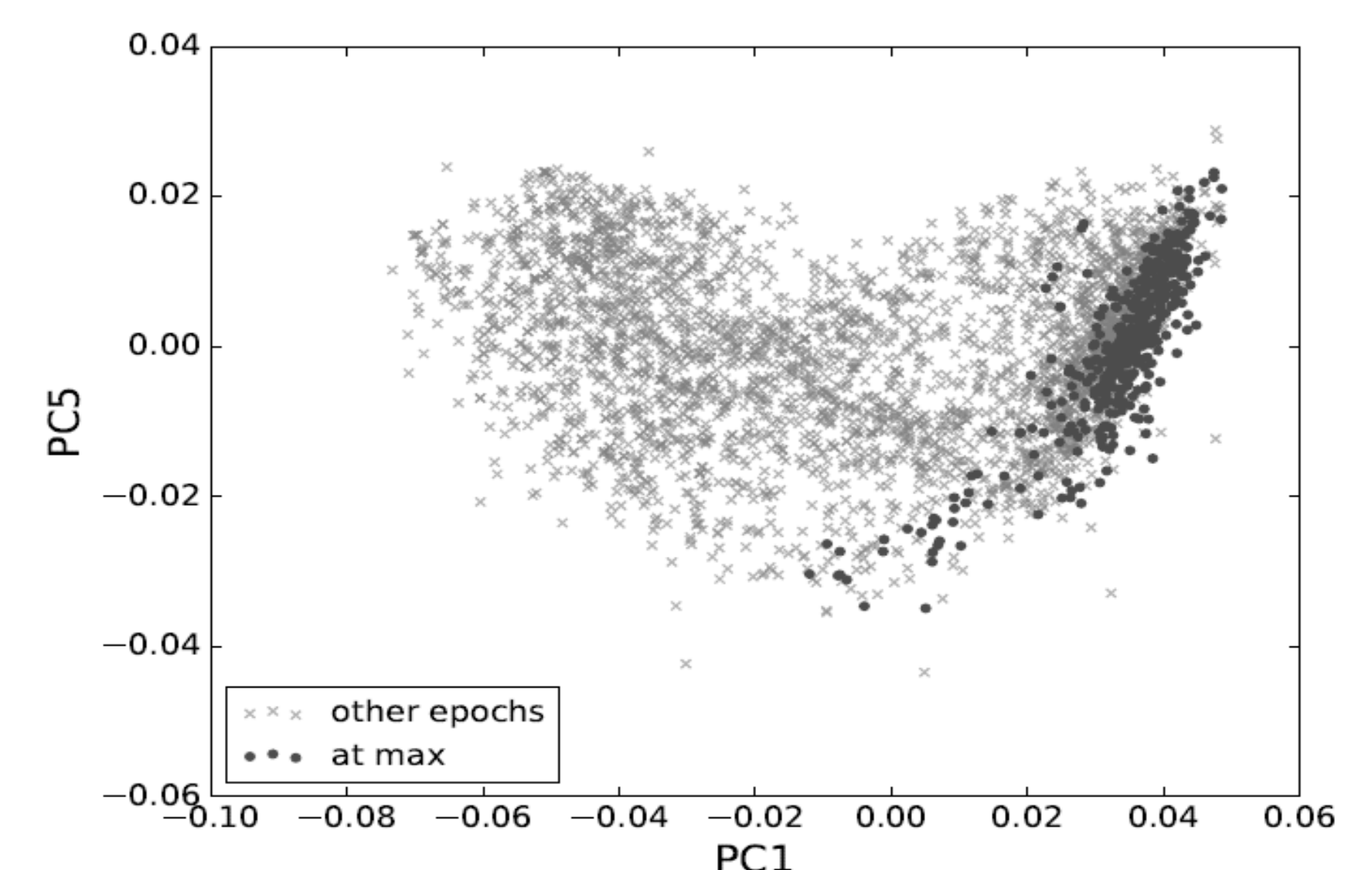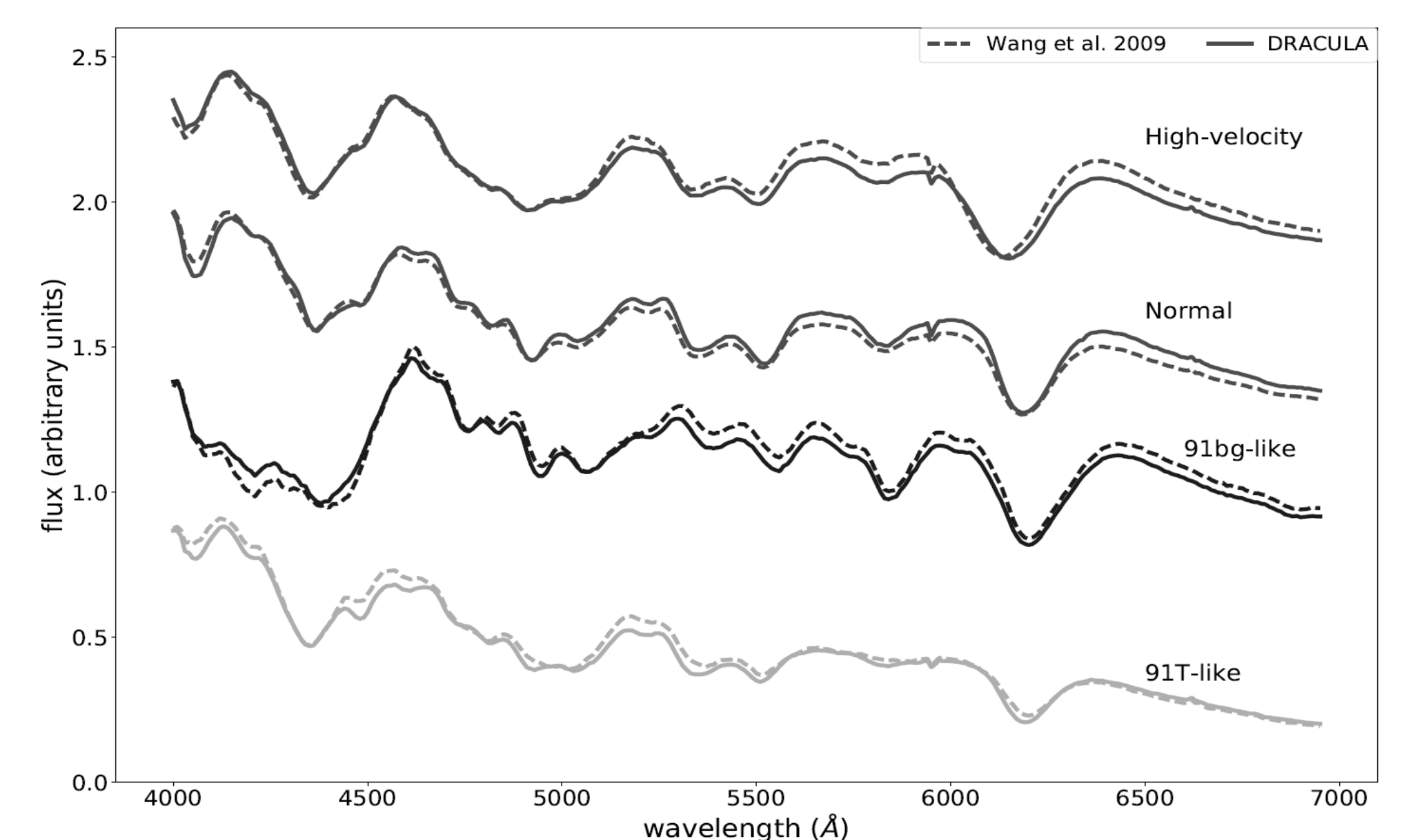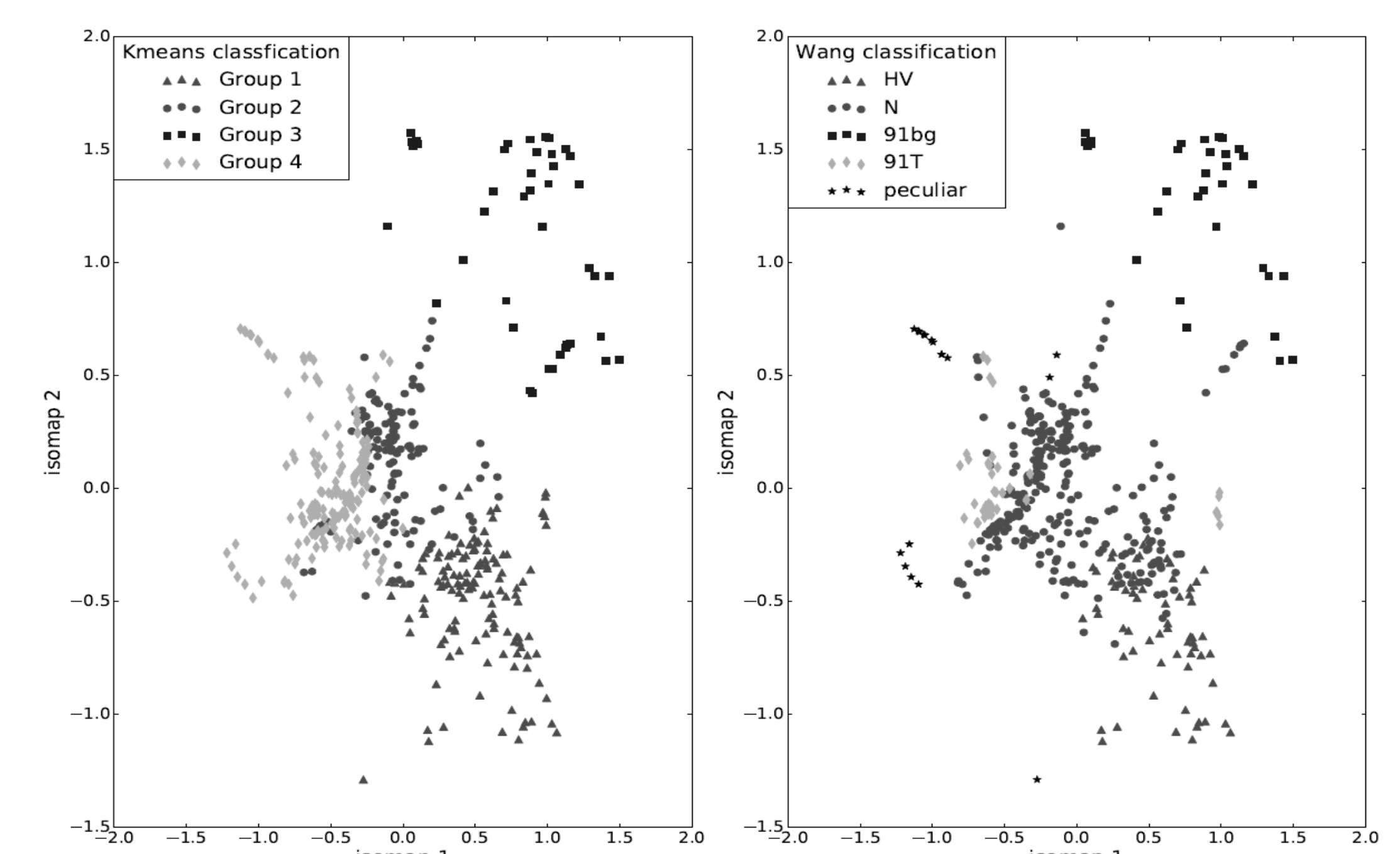
This type of algorithm can be used in future studies to guide theoretical modeling with insights taken from the data, but this will require a large, high quality data set.

C O I N ' S

Dracula

Dimensionality Reduction And Clustering
for Unsupervised Learning in Astronomy