High-contrast spectroscopy of exoplanet atmospheres

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Propositions

accompanying the dissertation

High-contrast spectroscopy of exoplanet atmospheres

1. Ultra-hot Jupiters have temperatures high enough that water is thermally dissociated in their atmospheres, with OH as a detectable product.
   (Chapter 2)

2. Spectral matched filtering is a powerful technique for detecting and characterizing exoplanets, both at high and moderate spectral resolution.
   (Chapters 2, 3 and 4)

3. Individually optimizing different parts of an instrument and the data analysis without considering one another leads to suboptimal performance.
   (Chapters 4 & 5)

4. Machine Learning can improve the performance of adaptive optics systems.
   (Chapters 5 & 6)

5. Combining high-contrast imaging with high-resolution spectroscopy will be our best chance at searching for biosignatures in the next two decades.

6. Problems encountered in one field of research have often already been encountered and solved in another unrelated field.

7. A small group of researchers working closely together on a topic can achieve much more than the same number of researchers working on their own.

8. Following machine learning practices, the design and optimization of data reduction and analysis pipelines should be performed on a different dataset than the one that is being analyzed, in order to minimize confirmation bias.

9. Approaching the PhD as a consistent nine to five job gives the best chance of finishing it in time while staying sane.

10. Working from home and only having online meetings results in a large decrease in scientific creativity and productivity of research groups.

11. One should not bring a backpack to a Las Vegas pool party.

12. Artificial intelligence is already having a major impact on society, and we should be wary of malicious or poorly chosen optimization objectives.

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