Quantifying Quasar Outflows



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What is a Quasar?



Gas and dust forms around Supermassive Black Hole in Galactic Center

Some have jets that shoot energy out from central engine at relativistic speeds

Why do we Care?

- Quasar Wind Theory-Energy from quasar winds affects gas and dust throughout host galaxy
- Farrah et al "anticorrelation between outflow strength and the contribution from star formation to the total IR luminosity"



Duncan Farrah, Tanya Urrutia, Mark Lacy, Andreas Efstathiou, Jose Afonso, Kristen Coppin, Patrick B. Hall, Carol Lonsdale, Tom Jarret, Carrie Bridge, Colin Borys, and Sara Petty, The Astrophysical Journal 745:178 (2012)

Methodology

- Modeling 26
 Quasars
- Manually manipulate parameters to create a close fit



Emcee



200 walkers move through 20,000 simulations for each parameter

The distribution of the walkers is used to determine the best value for each parameter



Final Result

Use parameter ⁴⁰/₃₅
 values from ³⁰
 Emcee to make ²⁵/₂₀
 best fit ¹⁵/₁₀

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 Highly constrained parameters help us determine physical conditions of the quasar

