## Astronomy Department Faculty Publication Series

# Beyond the Best-fit Parameter: New Insight on Galaxy Structure Decomposition From GALPHAT

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**Abstract**
We introduce a novel image decomposition package, Galphat, that provides robust estimates of galaxy surface brightness profiles using Bayesian Markov Chain Monte Carlo. The Galphat-determined posterior distribution of parameters enables us to assign rigorous statistical confidence intervals to maximum a posteriori estimates and to test complex galaxy formation and evolution hypotheses. We describe the Galphat algorithm, assess its performance using test image data, and demonstrate that it has sufficient speed for production analysis of a large galaxy sample. Finally we briefly introduce our ongoing science program to study the distribution of galaxy structural properties in the local universe using Galphat.

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