Review report for
" Approximate Bayesian Computation for Sculptor Dwarf Galaxy's Dark Matter Density Profile"
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January 29, 2016

Summary

Section 3 is the methodology section of the paper. The paper is about restricting parameters in the ΛCDM model that concern the dark matter profile. Since the model is very complicated, a classical Bayesian approach wouldn't be helpful, since the likelihood cannot be written out explicitly with dependencies between different variables and the integration gets intractable. Approximate Bayesian computation is used to use a forward process to get around the likelihood function in giving a (approximate) posterior distribution of the parameters of interest.

The general notion of Approximate Bayesian computation is introduced. Then the variant of ABC used in this project is described in more detail. The NFW model, which is used for setting up the forward model, is then introduced. The model is used to facilitate a rejection sampling algorithm for simulating galaxies. Then there are also discussion about using the method under a reduced setting and the problems in selecting summary statistics and distance function for the ABC.

General comments

I think the contents are good and generally clear. It could be improved a lot, however, if some summarizing and transitioning paragraphs/sentences are added. The connections between different subsections are not very clear in the current form and it may waste some of readers mental energy to figure out. Maybe it would be helpful to have a paragraph or two right after the section title summarizing the general flow of each subsection so that readers can have a big picture and know what each part fits in the analysis process.

Another thing that bothers me a little is that there seems to be a fair amount of results in the methodology section. I'm wondering whether it's designed to be like that. The results section of the paper doesn't seem to be too long, so it might get better if all discussion about results get moved to that part. (I understand some results of failed attempts are needed to motivate other methods, but there seems to be more results than these necessary ones.)

Minor comments

There are a few spelling, grammatical and notation problems. I marked them up on a paper copy and will send it to the author.