Report: **PARALLEL ADAPTIVE IMPORTANCE SAMPLING** by Cotter, Cotter and Russell. Submitted to the consideration of *Journal of Uncertainty Quantification.*

A very similar version of the authors' PAIS algorithm has been studied before, as explained by the second referee. Moreover, I could argue that the PAIS algorithm is a particular case since weights are considered deterministic. This is a serious issue in the paper, let alone that the authors are unaware of the series of papers mentioned by referee 2, that are closely related to their work.

This should be explained in detail and the paper original perspective and contributions be further highlighted.

An other serious concern is why not use PMC-MCMC for the updating scheme in Algorithm 1. That would be as costly (since it also involves evaluating the posterior) but the y_is will have the correct distribution.

The "automatic" tuning will be as useful as the what traditional adaptive tuning is: in the limit, the proposal cov matrix converges to the cov matrix of the target. This is ok for Gaussian type targets but will fail for multimodal, multiscale distributions, mostly present in non-trivial forward maps, as those suggested in section 2. Something similar happens with gradient based proposals, since from the onset they are not conceived to scape local maxima.

In Algorithm 1, note that in step 5 the actual number of different particles could be drastically reduced and in some cases collapsed to 1. As mentioned by the authors, this is a basic concern in SIR type algorithms, that they may become totally inefficient. Then, why this seems not to bother the authors and no provision was included in their algorithm to mend this problem?

Minor comments:

1. The Radon-Nokodyn version of Bayes theorem in (2.3) is unnecessary in the actual finite dimensional context the authors work with. The authors should state that, although there is an infinite dimensional version for the posterior distribution, their discussion is restricted to the parametric, finite dimensional case.

2. Note that in (2.4) the total measure of the space for $\hat{\eta}$ is M (!).