The question we want to address is: the standard BAO analysis generally assumes flat geometry. Does this assumption affect the cosmological findings?

Motivation: a big deal is being made by part of the community that BAO data are consistent with flatness, but this may be a circular argument as the standard BAO analysis is done under the assumption of flatness. What if the Universe were in fact non spatially flat? (arXiv:2101.03129, arXiv:2010.02230, arXiv:2003.04935, arXiv:1911.02087, arXiv1811.11963)

Check to be done: drop the flatness assumption and see what happens.

Step one: familiarize with BAO analyses. Antonio proposes a few ”classic” (self?)refs to study

BAO analyses involve:

At the pipeline level (data reduction):

- do reconstruction (codes publicly available)
- get power spectra (monopole and multipoles) and covariances (codes for power spectra publicly available)

At the template-fitting level (theory codes):

- convert z into distances
- fit with templates to get alphas (also codes available)
- interpret in terms of cosmology (also codes available)

This is where we want to check for biases wrt input (fiducial) cosmology in the case of k≠0

The least constrained case from Planck 2018 is $\Omega_K = -0.056\ ^{+0.028}_{-0.018}$ (68 %, TT+lowE), which is eq. (46a) in Planck 2018 results VI Cosmological parameters arXiv:1807.06209
The “problematic” case is $\Omega_K = -0.044\ ^{+0.018}_{-0.015}$ (68 %, TT,TE,EE+lowE) ~2.4σ away from 0

Ask yourself: where is the flatness assumption being made?

Step two: reproduce standard analyses (assuming flatness)

Step three: now drop flatness assumptions, what changes? By how much?

Other possibly related refs: arXiv:1808.04384 arXiv:1906.03035