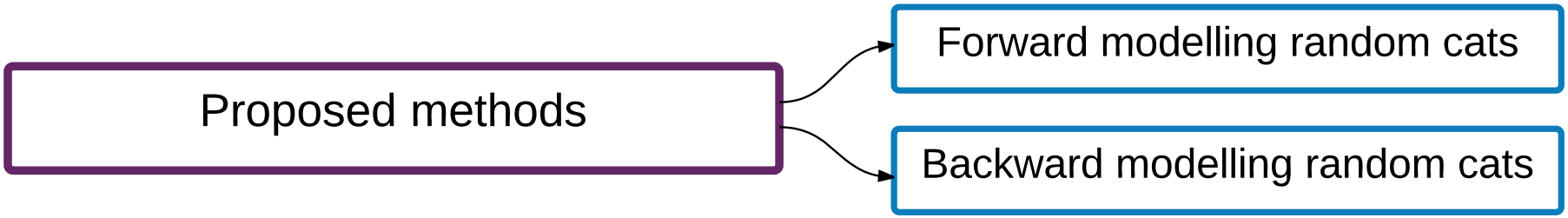
LSS Catalogue Generation-Progress Report 05/11/15

- We have now met with Imaging, Fiber Assignment and Spectro pipeline groups.
- Discussions have led to much better understanding of the systematic errors that affect the data signal at each step.
- From discussions we have made progress on how we expect to construct our catalogues to account for these effects.
- The results of this have been put in a document on the wiki.
- To summarise our results...

Selection function effects 1: Imaging and Targeting

Potential sources of systematic errors

- Variations in image survey depth including scatter from target algorithm.
- Bright objects that occult source images.
- Variations in seeing.
- Variation in stellar density across the survey.
- Variations in airmass.
- Extinction (we don't need a correction term but must try and understand the error in our knowledge of this).
- Variations in sky brightness
- Tractor code efficiency.
- De-blending of overlapping images.



Selection function effects 1: Imaging and Targeting

Proposed methods-Imaging 1

Forward modelling random cats

Requirements:

- Need ref catalogue of good imaging data
- Ref cat. includes all targets that could be selected
- Includes gals that will get good and bad redshifts.

Method:

- Degrade ref. gal to imaging gal signal at that ra,dec
- Inject fake source at random ra,dec.
- Run tractor to find magnitude.
- Remove occulted sources.
- Keep fake sources that pass target selection.

Disadvantages:

- Randoms are 100xdata -can Tractor deal with this?
- What if position is known? Increased efficiency?
- Will require deep good quality ref. catalogue, where will this come from?

Selection function effects 1: Imaging and Targeting

Proposed methods-Imaging 2

Backward modelling of effects

Method:

- Start with statistically isotropic sample in footprint
- Weight gals or randoms to correct for the imaging systematics.
- Need to know the angular distribution of systematics.
- Model variation in target density with effect X.
- Apply weights to mimic uniform completeness.

Disadvantages:

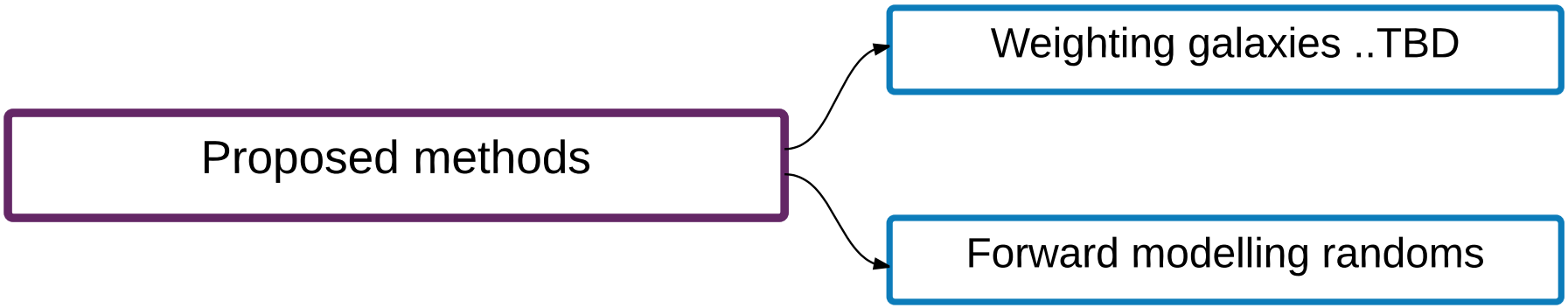
- Effects are not purely angular-correlations with angular and radial density.
- This makes this method complicated.

Conclusion: Both methods have difficulties-try and do both and see if the results match.

Selection function effects 2: Fiber Assignment

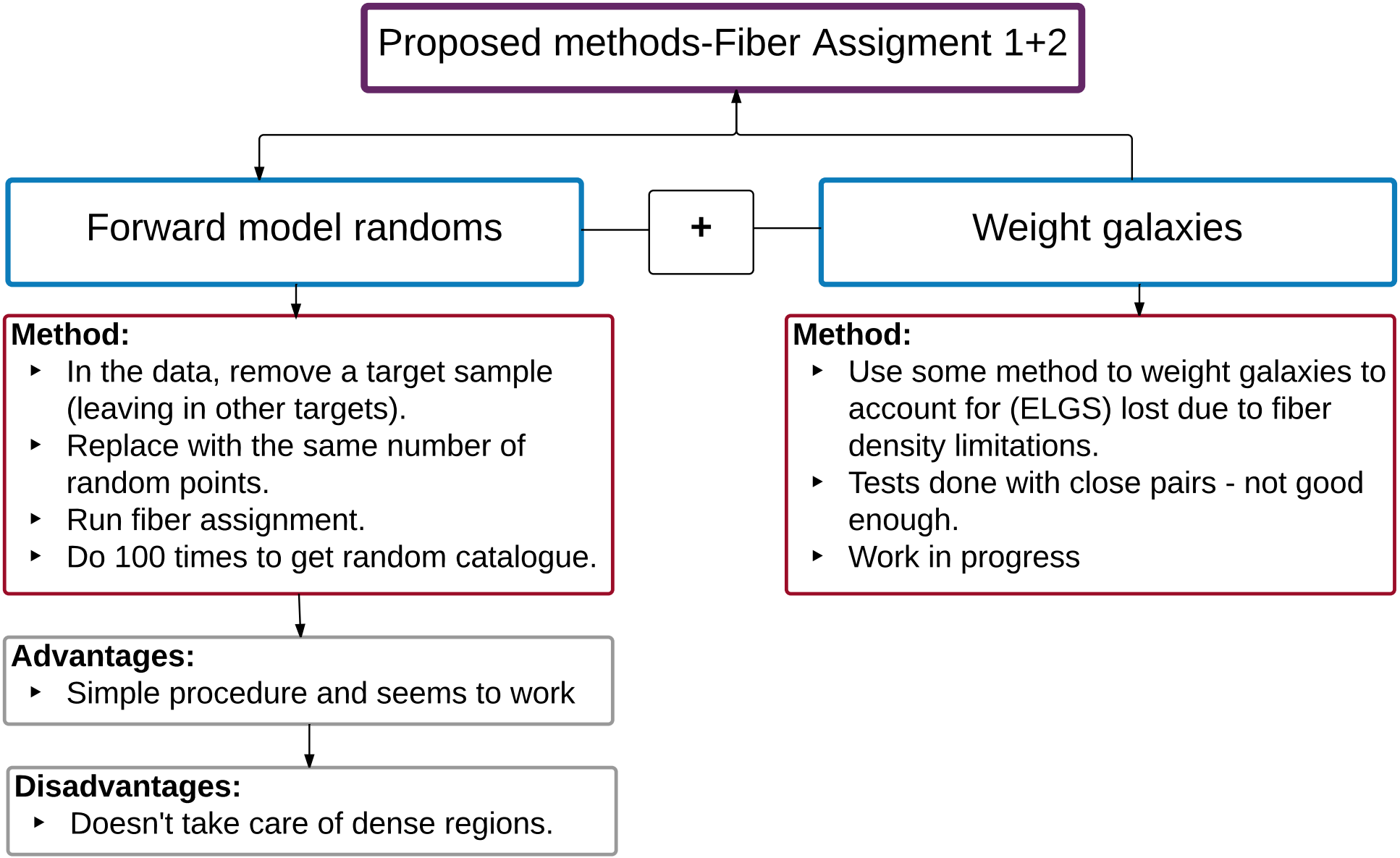
Potential sources of systematic errors

- Priority targets
- Density dependent efficiency of selection (higher density less likely to be selected).
- Step in code to optimise number of fibers allocated (more efficient in mid-density regions).



Selection function effects 2: Fiber Assignment

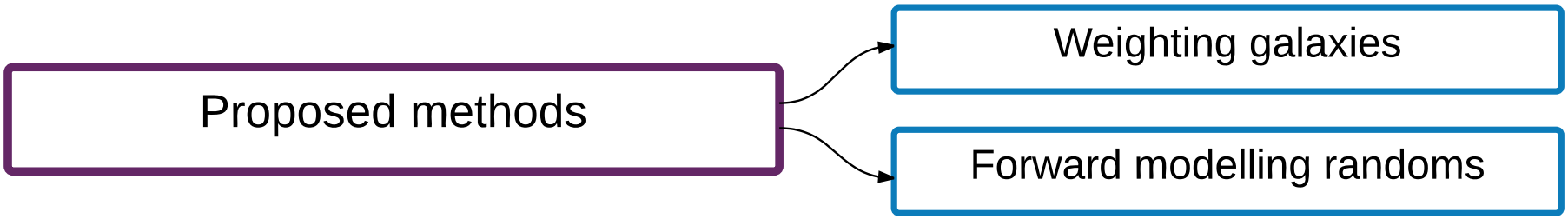
Both of these systematics to be corrected in some way



Selection function effects 3: Spectroscopy

Potential sources of systematic errors

- Angular fluctuations in the sky lines due to time varying OH in the atmosphere.
- Variations in seeing.
- Variations in airmass.
- Extinction (try and understand the error in our knowledge of this).
- Moon phase.
- Fiber position on the plate.
- Position on CCD



Selection function effects 3: Spectroscopy

Proposed methods-Spectro 1

Weighting galaxies

Requirements:

- Need ref catalogue of high completeness spectro data (DEEP data or commissioning?)

Method:

- Use the measured noise vector at a location and turn into a comparison of reference redshift distribution and that expected at that position.
- Upweight galaxies to push completeness up to a standard level.
- To make it simpler look at the O-II line and pick up the average noise in this region (for example)-then dealing with one number to quantify the noise.

Disadvantages:

- Will require the high fidellity ref. catalogue.

Selection function effects 3: Spectroscopy

Proposed methods-Spectro 2

Forward modelling randoms

Method:

- Run random sample through QuickCat to reduce completeness according to typical incompleteness of data.
- Need to refer to 2D pixel extraction code to get sky level (ra,dec) and callibrate to estimate observed photon counts for fake data.
- Run degraded spectra through redshift fitting code to decide if measured or not.

Disadvantages:

- Running randoms through tiling - different distributions on the sky

Conclusion: Both methods have difficulties-try and do both and see if the results match.

To conclude:

Preliminary document with more detail will be put on the LSS wiki page

https://desi.lbl.gov/trac/wiki/LargeScaleStructureCats

To do:

- Identify the plan for next 6 months
- Identify a suite of tests that we will need to carry out to check the quality of our catalogues.