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Cosmology on the Largest Scales

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Ultra-large cosmic scales supply a wealth of information most valuable for strengthening our knowledge of the Universe. For instance, they can teach us about the physical processes at play during the inflationary epoch, or enable us to either further confirm or rule out Einstein's theory of general relativity. This is because: on the one hand, there are relativistic corrections to the Newtonian prediction that only become important on extremely large scales; and, on the other hand, those scales may hide signatures of modifications to gravity. However, the largest cosmic scales have hitherto proven to be utterly difficult to access. Here, I show how it will be possible to access the ultra-large scale information with the next generation of cosmological surveys such as Euclid or the Square Kilometre Array. I will also show that ultra-large scale effects must be properly taken into account in the view of future cosmological experiments, if we do not want to bias our results.

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