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The BAO method and the DESI experiment

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Before the epoch of recombination, the Universe was permeated with a baryon-electron-photon plasma. While gravity gave rise to the collapse of the initial overdensities, the radiation pressure served as a counterforce, thus resulting in the free propagation of sound waves within the primordial plasma. This corresponds to the oscillatory pattern that can be observed in the CMB two-point statistics and is referred to as the Baryon Acoustic Oscillations (BAO) phenomena. Furthermore, the same feature can be measured in the two-point statistics of the late-time large-scale structure clustering of galaxies. The characteristic scale associated to the oscillations can then be used as a standard ruler, which in turn can serve as a powerful probe of Dark Energy. The Dark Energy Spectroscopic Instrument (DESI) is currently on a 5-year quest to measure the spectra of more than 30 million galaxies in order to produce the most comprehensive 3D map of the Universe ever created. One of the main objectives of the DESI Collaboration is the measurement of the BAO feature. With the expected level of accuracy in mind, it becomes paramount to revise the methodology of the BAO method.

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