

Integrated Sachs-Wolfe maps from the Gower Street w CDM simulations

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The late-time linear Integrated Sachs-Wolfe (ISW) effect directly probes the dynamics of cosmic acceleration and the nature of dark energy. Detecting these weak, secondary temperature anisotropy signals of the CMB requires accurate theoretical predictions of their amplitude across cosmological models. By extending the pyGenISW package, previously limited to Λ CDM, we aim to generate full-sky ISW maps for a suite of 791 w CDM cosmologies using the Gower Street N-body simulations, thereby enabling ISW analyses across a broader dark-energy parameter space. We make our code and ISW data publicly available. We compute the ISW signals by tracing the time evolution of the gravitational potential across large-volume simulations that span dark energy equation of state parameters from phantom to quintessence, $-1.79 < w < -0.34$. These data are projected onto the sphere using HEALPix to obtain full-sky temperature maps. We validate our pipeline by comparing the measured ISW angular power spectra and ISW-density cross-correlations against linear theory expectations ($2 \leq \ell \leq 200$) computed with benchmarks from the pyCCL library. The agreement is excellent across the multipole range where the ISW contribution is expected to dominate, confirming the reliability of our modelling of gravitational-potential evolution. With additional tests of the ISW signal's strength in density extrema, as well as comparing all models to a reference Λ CDM cosmology, we found that quintessence-like models ($w > -1$) show higher ISW amplitudes than phantom models ($w < -1$), consistent with enhanced late-time decay of gravitational potentials. The consistency of our w CDM ISW maps and their agreement with theory predictions confirm the robustness of our methodology, establishing it as a reliable tool for theoretical and observational ISW-LSS analyses

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