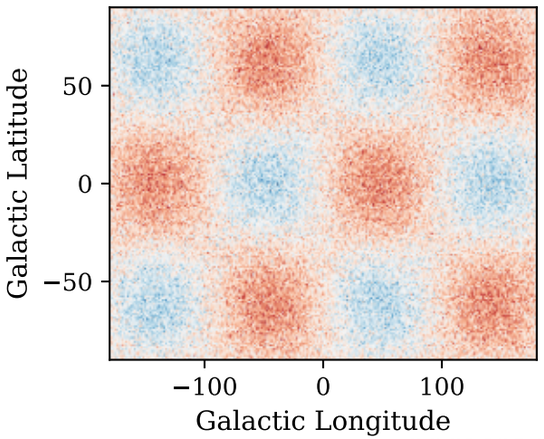
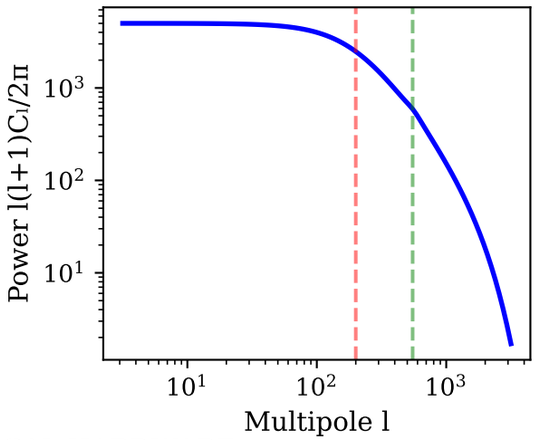
Hardware Validation 4: Cosmological Predictions are Observatory-Verified

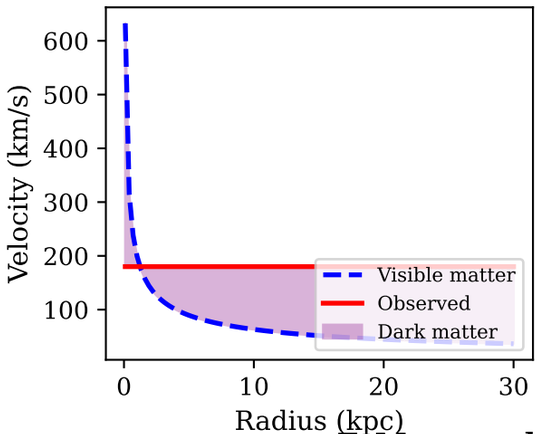
A. CMB Map (Planck)
T = 2.725 K ± μK



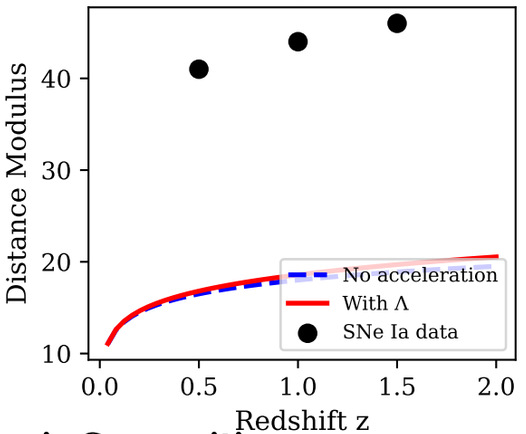
B. CMB Power Spectrum
(Acoustic Peaks)



C. Galaxy Rotation
(Dark Matter Evidence)



D. Type Ia Supernovae
(Dark Energy Evidence)



COSMOLOGICAL HARDWARE

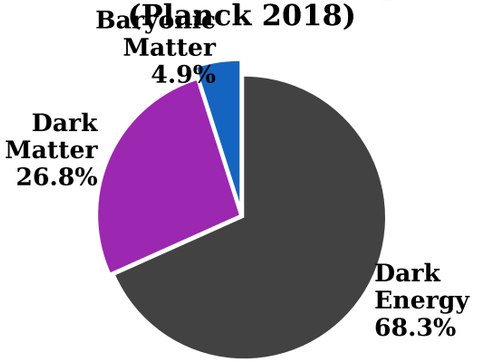
E. The Observational Hardware

CMB Measurements:
• Planck satellite (2009-2013): 30-857 GHz
• WMAP (2001-2010): 23-94 GHz
• Ground: ACT, SPT, BICEP

Galaxy Surveys:
• SDSS: 10^6 galaxies mapped
• Gaia: 10^9 stars measured
• HST: Deep field observations

Supernova Surveys:
• High-Z Supernova Search
• Supernova Cosmology Project
• Nobel Prize 2011 result

F. Measured Cosmic Composition
(Planck 2018)



G. Theory-Observation Comparison

THEORY PREDICTION vs OBSERVATION

Framework Prediction:		Planck Measurement:
Visible matter:	~5%	Baryonic: 4.9%
Dark sector:	~95%	Dark M+E: 95.1%
Mode occupation:	sparse	$\Omega_m + \Omega\Lambda \approx 1.0$

MATCH WITHIN OBSERVATIONAL UNCERTAINTY!

The ~5% visible matter prediction from mode occupation statistics matches Planck's 4.9% ± 0.1% measurement.

CYCLIC COSMOLOGY PREDICTIONS

H. Testable Predictions

Observable Signatures:
• CMB anomalies at large scales
(Planck data shows tension at l < 30)

• Gravitational wave background
(LISA/PTA sensitive range)

• Entropy bound constraints
(Bekenstein bound measurable)

These are HARDWARE-TESTABLE predictions
from the categorical exhaustion theorem.

Future observatories can test cyclicity.