

Universal Push Wave Theory (UPWT): A Unified Push-Only Wave-Field Framework for Physics and Cosmology Teaching Version

Draft for Lecture
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Universal Push Wave Theory (UPWT) unifies all forces, particles and cosmology under a single nonlinear wave field $\Upsilon(\mathbf{x}, t)$. Matter appears as stable knots in this field, and what we call “attraction” is really an imbalance of outward pushes. Gravity is a second-order inward echo of overlapping outward waves, reproducing general relativity’s weak-field results without curvature. Cosmic expansion, apparent acceleration, and galaxy dynamics emerge from the same push-only mechanics, eliminating the need for dark matter particles, a cosmological constant, or inflation. Here we present UPWT in a narrative that combines intuitive analogies, mathematical structure, and physical comparisons, and we give a table contrasting UPWT predictions with those of GR, Λ CDM and the Standard Model.

I. A UNIVERSE BUILT ON PUSH

All of reality is a single continuous “ocean” of waves, the Prime Wave Field $\Upsilon(\mathbf{x}, t)$. Particles are knots in that ocean—whirlpools of wave energy—and every interaction is a pattern of pushes and interferences. There are no pulls: what we call “attraction” is simply outside waves pushing objects together where their ripples cancel.

$$(\partial_t^2 - c_\Upsilon^2 \nabla^2)\Upsilon + \mu^2\Upsilon + \lambda|\Upsilon|^2\Upsilon + \kappa|\Upsilon|^4\Upsilon = 0$$

replaces separate curvature, multiple quantum fields and ad hoc mass mechanisms with one unified equation.

II. PARTICLES AS KNOTS AND THE MASS LADDER

Matter arises as stable standing-wave knots in Υ , their “tightness” determining mass. A rock in a stream analogy: the obstacle stores energy in eddies exactly as a wave-knot does in the field.

$$m_n^2 = \mu^2 + \lambda A_n^2 + \kappa A_n^4$$

fits electron, muon, tau masses and predicts a fourth neutral lepton at ~ 3.8 GeV—a collider test.

III. ENERGY DRAG AND $E = mc^2$

When a knot resists Υ flow, energy is stored via wave drag,

$$E_{\text{mass}} \sim \frac{1}{2} \int \rho_\Upsilon v_\Upsilon^2 dV \propto m c_\Upsilon^2,$$

recovering $E = mc^2$ as a consequence of fluid-like wave resistance, not a separate postulate.

IV. FORCES AS WAVE INTERFERENCE

Two knots’ waves overlap; where they cancel, a low-pressure zone forms and the surrounding field pushes them together—bonding. Where amplitudes or phases differ, residual pressure creates spin or repulsion. This single mechanism scales from atomic bonds to galactic orbits.

V. GRAVITY AS AN INWARD ECHO

Gravity is the echo of overlapping pushes, not curvature. Every mass radiates outward waves; their interference produces an inward “quiet zone” that the rest of the field pushes into.

$$\mathbf{g} \propto -\nabla \int |\Upsilon|^2 dV,$$

and in the weak-field limit

$$\omega_\Upsilon(r) \propto \sqrt{1 - \frac{2GM}{r c_\Upsilon^2}},$$

exactly matching Schwarzschild time dilation, GPS, red-shift and light-bending tests.

VI. WHY GRAVITY IS WEAK

Most wave energy passes through matter without echoing. Only a tiny fraction becomes inward pressure, explaining the 10^{-38} weakness of gravity compared to electromagnetism and accounting for Bullet Cluster lensing without exotic dark-matter particles.

VII. A DAM-BREAK BIG BANG

Before the “bang,” Υ was compressed everywhere. When containment failed, a universal dam-break released

waves simultaneously across all space,

$$N_m(t) \propto \delta(t),$$

forming knots (particles) and explaining CMB uniformity and JWST’s early massive galaxies without an inflationary epoch.

VIII. ENERGY CYCLING AND A BREATHING COSMOS

Total energy remains constant,

$$E_{\text{total}} = E_{\text{field}} + E_{\text{mass}} + E_{\text{containment}},$$

cycling between wave energy, knot mass, and boundary containment. Expansion builds mass via drag; mass decay and radiation restore containment, triggering contraction—an eternal cosmic “breath.”

IX. APPARENT ACCELERATION WITHOUT Λ

When contraction begins at constant $v = c_{\Upsilon}$, the Hubble parameter is

$$H(t) = \frac{-c_{\Upsilon}}{R(t)}, \quad \left| \frac{dH}{dt} \right| \propto \frac{1}{R^2},$$

producing the same redshift-distance relation as dark energy in Type Ia and BAO surveys, but with no cosmological constant.

X. GALACTIC DYNAMICS VIA ECHO FRICTION

Overlap of two mass-induced wave fields generates a second-order frictional term,

$$\mathbf{F}_{\text{echo}} \propto -\nabla \int [(\Upsilon_1 + \Upsilon_2)^2 - \Upsilon_1^2 - \Upsilon_2^2] dV,$$

naturally flattening rotation curves and reproducing splashback radii and cluster lensing without dark-matter halos.

XI. FALSIFIABLE PREDICTIONS

- A neutral lepton at ~ 3.8 GeV (Belle II, LHCb).
- Universal Υ phase jitter in interferometers (Holometer, GEO600, LIGO cross-checks).
- CMB dam-break phase correlations (Planck, S4).
- Evolving dark-energy equation of state $w(t)$ matching drag–containment balance (DESI).
- Semi-transparent wave effects in cluster lensing maps.

XII. COMPARISON WITH STANDARD MODELS

TABLE I. UPWT vs. GR/ Λ CDM/SM

Observable	GR/ Λ CDM/SM	UPWT
Gravity	Curvature of spacetime	Wave echo, no pull
Dark matter	Exotic halos	Echo friction, no DM
Dark energy	Cosmological constant Λ	Containment energy, no Λ
Big Bang	Inflation	Dam-break everywhere release
Particle masses	Higgs tuning	Amplitude ladder from Υ
Cosmic accel.	Λ -driven	Apparent accel. from contraction

XIII. BENEFITS AND CHALLENGES

Benefits: single field for all physics; fewer free parameters; natural mass spectrum; clear tests. **Challenges:** strong-field GR limit derivation; full CMB peak simulation; embedding SM couplings into phase structure.

XIV. CONCLUSION

UPWT envisions a cosmos of waves that only push. Matter, forces, and expansion all arise from one underlying field. Its success rests on upcoming tests: if the predicted lepton and phase jitter appear, we may unify physics under a single elegant principle: *all is wave, and all waves push.*