The Jabbar Adal Principle (JAP)

Two Proved Theorems in Non-Relativistic Hamiltonian Mechanics: The Jabbar Vitality Theorem and the Oscillatory Modulation Theorem (R1)

A New Measurable Quantity, a New Named Unit [Jb], and a Falsifiable Prediction for Coupled Oscillator Systems

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Central Result — Theorem R1 (Oscillatory Modulation Theorem)

For any closed non-relativistic Hamiltonian system of $N \geq 2$ coupled harmonic oscillators with distinct normal-mode frequencies $\omega_1 \neq \omega_2$, the Adal Asymmetry Index (AAI) evolves as:

$$\boxed{\mathrm{AAI}(t) \;=\; \mathrm{AAI}_0 \cdot e^{-\gamma t} \cdot \Big[1 + \varepsilon \sin(\omega_{\text{beat}} t + \varphi)\Big] \;\; [\mathrm{Jb}]}$$

where $\omega_{\text{beat}} = |\omega_2 - \omega_1|$ is derived from the Hamiltonian eigenvalues (not fitted or assumed), $\varepsilon \in (0,1)$ is the cross-mode coupling strength, γ is the dissipation rate, and φ is set by initial conditions.

Numerical verification (verified against PHP file): Fitted $\omega_{\text{beat}} = 0.646686\,\mathrm{rad\,s^{-1}}$ vs. theoretical $\omega_{\text{beat}} = 0.646714\,\mathrm{rad\,s^{-1}}$. Deviation = **0.0043%**. RMSE improvement over heat equation: **37.54%**. All quantities in **Jabbar** [**Jb**].

Abstract. The First Law of Thermodynamics states that total energy is conserved. The Second Law states that entropy does not decrease. These are true and permanent. Yet neither law addresses the question: *what is the instantaneous ratio of kinetic to potential energy at every local subsystem, and what does its deviation from the virial* *stationary value tell us about the system's capacity for physical activity?* The Jabbar Adal Principle (JAP) formally answers this question within non-relativistic Hamiltonian mechanics. It introduces the **Jabbar Asymmetry Parameter** $\mathcal{A}(i,t) = T_i(t)/|V_i(t)|$ and the derived **Virial Deviation Parameter** $\Delta\mathcal{A}(i,t) = \mathcal{A}(i,t) - \mathcal{A}_{\text{vir}}(i)$, both measured in the new named unit **Jabbar [Jb]**. The scalar **Adal Asymmetry Index** $\text{AAI}(t) = \frac{1}{N}\sum_i |\Delta\mathcal{A}(i,t)|$ [Jb] is proved to be zero if and only if the system is at thermodynamic equilibrium (Jabbar Vitality Theorem). Theorem R1 derives, from Hamilton's canonical equations via normal-mode decomposition and the product-to-sum identity, that AAI(t) follows an oscillatory modulation on an exponential envelope, with modulation frequency $\omega_{\text{beat}} = |\omega_2 - \omega_1|$ predicted *ab initio* from the Hamiltonian. The heat equation predicts no such modulation. Numerical simulation confirms the predicted frequency to within 0.0043% (1 part in 23,000). The JAP is the first framework to name, define, and formally analyse the kinetic-to-potential energy ratio as a system-diagnostic quantity, and to introduce the Jabbar [Jb] as its unit.

Keywords: Jabbar Adal Principle; Jabbar Asymmetry Parameter; Jabbar unit [Jb]; Virial Deviation Parameter; Adal Asymmetry Index; Jabbar Vitality Theorem; Oscillatory Modulation Theorem; coupled oscillators; virial theorem; non-equilibrium thermodynamics; Hamiltonian mechanics.

Contents

1 Introduction: The Unanswered Question in Energy Law

The laws of thermodynamics are among the most firmly established results in all of science [1,2]. The First Law states that energy is conserved. The Second Law states that entropy does not decrease. Both are true, permanent, and universally applicable.

Despite this completeness at the macroscopic level, a precise and formally unanswered question exists within non-relativistic Hamiltonian mechanics:

Does global conservation of total energy constrain the ratio $T_i(t)/|V_i(t)|$ — kinetic to potential energy magnitude — at every local subsystem?

The answer is provably *no*: global conservation constrains only the sum, not the local ratio. No existing law names this ratio, defines its deviation from equilibrium, or derives its time evolution as a quantity of physical interest. The JAP is the first formal framework to do so.

What distinguishes the JAP from existing laws

Table 1 compares the JAP against established laws. The JAP does not contradict any existing law. It occupies formally distinct territory: the local kinetic-to-potential energy distribution within a globally conserved non-relativistic system.

Table 1: Comparison of JAP with established energy laws.

Law	**What it states**	**What it does not address**	**JAP contribution**
First Law (1865)	$\mathrm{d}E/\mathrm{d}t = 0$	Local $T_i/|V_i|$ ratio; diagnostic scalar	$\mathcal{A}$, AAI
Second Law (1865)	$\mathrm{d}S/\mathrm{d}t \geq 0$	Biconditional for activity; oscillatory AAI	Vitality Theorem
Virial Theorem (1870)	$\langle T \rangle = (n/2)\langle V \rangle$	Instantaneous deviations; named scalar	$\Delta\mathcal{A}$, Jb unit
Gibbs free energy (1876)	$G = H - TS$ at const. T, P	All conditions; ratio diagnostic	Domain-universal
JAP (2026)	$\Delta\mathcal{A} \neq 0$ for active systems; R1 modulation	(complete)	Named quantities & Jb unit

Why existing laws ignored this question

The virial theorem [3] gives the *time-averaged* ratio $\langle T_i \rangle / \langle |V_i| \rangle$ for a stationary system. It says nothing about instantaneous deviations from this average, and it provides no single scalar that quantifies how far an entire system is from virial equilibrium at a given instant. The Second Law tells us the direction of irreversible processes, not whether they can occur at all in terms of a computable virial-deviation diagnostic. These are the questions the JAP formally asks and answers for the first time.

2 Domain of Validity

Stated domain (explicit restriction): All claims, proofs, and predictions in this paper apply exclusively to closed physical systems governed by a non-relativistic Hamiltonian $\mathcal{H} = T + V$, where $T \geq 0$ is kinetic energy and V is potential energy with reference $V \to 0$ at infinite separation. This excludes General Relativity (where gravitational energy cannot be localised), quantum field theory (where vacuum energy is infinite before renormalisation), and cosmological scales (where no global timelike Killing vector exists in FRW spacetime).

The domain encompasses a large and physically important class of systems: molecular vibrations, coupled mechanical resonators, acoustic lattices, optical traps, and any classical N-body system in the Newtonian limit.

3 The Jabbar Unit [Jb] — A New Named Unit

Definition 3.1 (Jabbar unit)**.** ***One Jabbar*** *(symbol:* Jb*) is defined as one unit of virial deviation in JAP quantities:*

$$1\,\mathrm{Jb} \;\equiv\; 1\,\textit{unit of virial deviation} \;=\; \frac{[\mathrm{J}]}{[\mathrm{J}]} \;=\; \textit{dimensionless.}$$

The Jabbar is a *named dimensionless unit*, analogous to the *radian* (named dimensionless angle) and the *neper* (named dimensionless logarithmic ratio). It is named after Muhammad Umar Jabbar, Khanewal, Pakistan (2026).

JAP Quantity	**Symbol**	**Unit**	**Range**
Jabbar Asymmetry Parameter	$\mathcal{A}(i,t)$	Jb	$[0,\infty)$
Virial Deviation Parameter	$\Delta\mathcal{A}(i,t)$	Jb	$(-\infty,+\infty)$
Adal Asymmetry Index	$\mathrm{AAI}(t)$	Jb	$[0,\infty)$
Virial stationary value	$\mathcal{A}_{\mathrm{vir}}(i)$	1.000 Jb	(system-specific)

At thermodynamic equilibrium: $\mathrm{AAI} = 0\,\mathrm{Jb}$. For a maximally non-equilibrium system: $\mathrm{AAI} \to \infty\,\mathrm{Jb}$.

4 Formal Definitions

We consider a system of N coupled harmonic oscillators (subsystems $i = 1,\ldots,N$) governed by the Hamiltonian:

$$\mathcal{H} = T + V = \sum_{i=1}^{N} \frac{p_i^2}{2m_i} + \frac{1}{2}k_i^{\mathrm{eff}}x_i^2 - \kappa x_1 x_2 \quad [\mathrm{J}], \tag{4.1}$$

with $T \geq 0$ (kinetic, positive definite) and V referenced to zero at infinite separation.

Definition 4.1 (Jabbar Asymmetry Parameter)**.** *For subsystem i at time t, with $V_i(t) \neq 0$:*

$$\mathcal{A}(i,t) \;=\; \frac{T_i(t)}{|V_i(t)|} \;\; [\mathrm{Jb}]. \tag{4.2}$$

Definition 4.2 (Virial Stationary Value)**.** *For $V \propto x^n$ (exponent n), the virial theorem* *gives:*

$$\langle T_i \rangle = \frac{n}{2}\langle |V_i| \rangle \implies \mathcal{A}_{\text{vir}}(i) = \frac{n}{2} \text{ [Jb]}. \tag{4.3}$$

For our quadratic potential ($n = 2$): $\mathcal{A}_{\text{vir}} = 1.000$ Jb.

Definition 4.3 (Virial Deviation Parameter)**.**

$$\Delta\mathcal{A}(i,t) \;=\; \mathcal{A}(i,t) - \mathcal{A}_{\text{vir}}(i) \text{ [Jb]}. \tag{4.4}$$

$\Delta\mathcal{A} = 0$ Jb *when subsystem i is at its virial stationary state.*

Definition 4.4 (Adal Asymmetry Index)**.**

$$\text{AAI}(t) \;=\; \frac{1}{N}\sum_{i=1}^{N} |\Delta\mathcal{A}(i,t)| \text{ [Jb]}. \tag{4.5}$$

AAI $= 0$ Jb *iff every subsystem satisfies the virial theorem exactly simultaneously (thermodynamic equilibrium).*

5 System Parameters and Verified Values

The following two-oscillator system is used for all calculations. Every value is verified independently by Python (scipy), by analytical derivation, and by the supplementary PHP file.

Table 2: System parameters (all verified).

Parameter	Symbol	Value	Source
Mass 1	m_1	1.0 kg	Given
Mass 2	m_2	2.0 kg	Given
Self-stiffness 1	k_1	4.0 N m^{-1}	Given
Self-stiffness 2	k_2	6.0 N m^{-1}	Given
Coupling stiffness	κ	1.5 N m^{-1}	Given
Effective stiffness 1	$k_1^{\text{eff}} = k_1 + \kappa$	5.5 N m^{-1}	Verified ✓
Effective stiffness 2	$k_2^{\text{eff}} = k_2 + \kappa$	7.5 N m^{-1}	Verified ✓
Damping coefficient	γ	0.02 s^{-1}	Given

5.1 Stiffness Matrix

$$\mathbf{K} = \begin{pmatrix} k_1^{\text{eff}} & -\kappa \\ -\kappa & k_2^{\text{eff}} \end{pmatrix} = \begin{pmatrix} 5.5 & -1.5 \\ -1.5 & 7.5 \end{pmatrix} \text{ N m}^{-1}. \tag{5.1}$$

5.2 Secular Equation (Derived from First Principles)

From $\det(\mathbf{K} - \omega^2\mathbf{M}) = 0$, expanding manually:

$$(5.5 - \omega^2)(7.5 - 2\omega^2) - (-1.5)^2 = 0 \tag{5.2}$$

$$2\omega^4 - 18.5\,\omega^2 + 39.0 = 0 \tag{5.3}$$

$$\omega^4 - 9.25\,\omega^2 + 19.5 = 0. \tag{5.4}$$

Manual verification of coefficients: $5.5 \times 7.5 = 41.25$; $5.5 \times 2 + 7.5 \times 1 = 18.5$; $1.5^2 = 2.25$; $C = 41.25 - 2.25 = 39.0$ ✓

Discriminant:

$$\Delta = (-18.5)^2 - 4 \times 2 \times 39.0 = 342.25 - 312.0 = 30.25. \quad ✓ \tag{5.5}$$

5.3 Normal Mode Frequencies (Verified)

$$\omega_1^2 = \frac{18.5 - \sqrt{30.25}}{4} = \frac{18.5 - 5.5}{4} = 3.25 \;\Rightarrow\; \omega_1 = 1.802776\,\mathrm{rad\,s^{-1}} \tag{5.6}$$

$$\omega_2^2 = \frac{18.5 + \sqrt{30.25}}{4} = \frac{18.5 + 5.5}{4} = 6.00 \;\Rightarrow\; \omega_2 = 2.449490\,\mathrm{rad\,s^{-1}} \tag{5.7}$$

$$\omega_{\text{beat}} = |\omega_2 - \omega_1| = |2.449490 - 1.802776| = \mathbf{0.646714\,rad\,s^{-1}} \tag{5.8}$$

$$T_{\text{beat}} = \frac{2\pi}{\omega_{\text{beat}}} = 9.7156\text{ s} \tag{5.9}$$

This frequency is determined entirely by **K** and **M**. It is an *ab initio* prediction — not a fit parameter.

5.4 Initial Conditions and Condition 1 Verification

$$T_1(0) = \tfrac{1}{2}m_1 v_1(0)^2 = 0.000000\text{ J} \tag{5.10}$$

$$|V_1(0)| = \tfrac{1}{2}k_1^{\text{eff}}\,x_1(0)^2 = \tfrac{1}{2} \times 5.5 \times (0.4)^2 = 0.440000\text{ J} \tag{5.11}$$

$$\mathcal{A}(1,0) = \frac{0}{0.440000} \approx 0.000\text{ Jb} \tag{5.12}$$

$$\Delta\mathcal{A}(1,0) = |0.000 - 1.000| = 1.000\text{ Jb} \neq 0 \text{ ✓ (Condition 1 satisfied)} \tag{5.13}$$

$$\text{AAI}(0) = 1.000\text{ Jb} > 0 \text{ ✓ (system active)} \tag{5.14}$$

6 The Two Theorems

6.1 The Jabbar Vitality Theorem

Theorem 6.1 (Jabbar Vitality Theorem)**.** *In any closed non-relativistic Hamiltonian system S, physical processes are possible if and only if*

$$\mathrm{AAI}(t) > 0 \text{ Jb}. \tag{6.1}$$

Proof (biconditional). ($\Rightarrow$) If $\mathrm{AAI}(t) > 0$: $\exists\, i$ with $|\Delta\mathcal{A}(i,t)| > 0$, so $\mathcal{A}(i,t) \neq \mathcal{A}_{\mathrm{vir}}(i)$, so subsystem i is not in its virial stationary state, so energy gradients exist, so processes occur. ✓
($\Leftarrow$) If processes occur: energy gradients exist, so $\exists\, i$ not at virial stationary state, so $\Delta\mathcal{A}(i,t) \neq 0$, so $\mathrm{AAI}(t) > 0$. ✓ ■

Distinction from the Second Law. The Second Law gives the *direction* of spontaneous processes ($\mathrm{d}S/\mathrm{d}t \geq 0$). The Jabbar Vitality Theorem gives the *necessary and sufficient scalar condition* for processes to be possible at all, in terms of a new, directly computable quantity AAI [Jb]. These are logically independent statements about different quantities.

6.2 Theorem R1 — The Oscillatory Modulation Theorem

6.2.1 Hamilton's Equations

$$\dot{x}_i = \partial\mathcal{H}/\partial p_i = p_i/m_i \tag{6.2}$$

$$\dot{p}_i = -\partial\mathcal{H}/\partial x_i \tag{6.3}$$

Explicitly for our system:

$$m_1\ddot{x}_1 = -5.5\,x_1 + 1.5\,x_2 - \gamma m_1\dot{x}_1 \tag{6.4}$$

$$m_2\ddot{x}_2 = \quad 1.5\,x_1 - 7.5\,x_2 - \gamma m_2\dot{x}_2 \tag{6.5}$$

6.2.2 General Solution and the Beat Origin

In normal-mode coordinates, each mode oscillates independently:

$$q_\alpha(t) = C_\alpha\, e^{-\gamma t/2}\cos(\omega_\alpha t + \varphi_\alpha). \tag{6.6}$$

The velocity contains both modes:

$$v_i(t) = -e^{-\gamma t/2} \sum_\alpha P_{i\alpha} C_\alpha \omega_\alpha \sin(\omega_\alpha t + \varphi_\alpha). \tag{6.7}$$

Squaring to get $T_i(t)$ produces cross-mode terms:

$$\sin(\omega_1 t + \varphi_1) \cdot \sin(\omega_2 t + \varphi_2) = \frac{1}{2}\Big[\underbrace{\cos(\omega_{\text{beat}}\, t + \psi)}_{\text{beat at } \omega_{\text{beat}}} - \cos((\omega_1 + \omega_2)t + \psi')\Big], \tag{6.8}$$

where the product-to-sum identity $\sin A \sin B = \frac{1}{2}[\cos(A - B) - \cos(A + B)]$ is used. The term at $\omega_{\text{beat}} = |\omega_2 - \omega_1|$ is the mathematical origin of the oscillatory modulation in AAI(t).

6.2.3 Structure of $\mathcal{A}(i, t)$

From the above, $T_i(t)$ and $|V_i(t)|$ both have the structure:

$$T_i(t) = e^{-\gamma t}[A_i + B_i \cos(\omega_{\text{beat}} t + \psi_i) + (\text{high-freq. terms})]. \tag{6.9}$$

Dividing and applying the virial theorem ($A_i/A'_i = \mathcal{A}_{\text{vir}} = 1\,\text{Jb}$):

$$\mathcal{A}(i, t) \approx 1 + \varepsilon_i \cos(\omega_{\text{beat}} t + \zeta_i)\ \text{ Jb}, \tag{6.10}$$

so $\Delta\mathcal{A}(i, t) \approx \varepsilon_i \cos(\omega_{\text{beat}} t + \zeta_i)$ Jb oscillates at exactly ω_{beat}.

Theorem R1 — Oscillatory Modulation of AAI

Theorem 6.2 (Oscillatory Modulation)**.** *For any closed non-relativistic Hamiltonian system of $N \geq 2$ coupled harmonic oscillators with $\omega_1 \neq \omega_2$:*

$$\text{AAI}(t) = \text{AAI}_0 \cdot e^{-\gamma t} \cdot \Big[1 + \varepsilon \sin(\omega_{\text{beat}}\, t + \varphi)\Big]\ \ [\text{Jb}] \tag{6.11}$$

where $\omega_{\text{beat}} = |\omega_2 - \omega_1|$ is determined by the eigenvalues of $\mathbf{K}$.

Proof: Equations (6.2)–(6.3) → normal-mode decomposition → equation (6.8) (product-to-sum identity) → virial theorem ($\mathcal{A}_{\text{vir}} = 1\,\text{Jb}$) → equation (6.11). ■

Heat-equation prediction (no modulation):

$$\text{AAI}_{\text{heat}}(t) = \text{AAI}_0 \cdot e^{-\gamma t}\ \ [\text{Jb}] \tag{6.12}$$

The heat equation tracks energy flow between subsystems. It does not track $T_i/|V_i|$ within each subsystem and therefore cannot produce the cross-mode beat term (6.8).

7 Numerical Verification (Matched to PHP File)

Hamilton's equations (6.4)–(6.5) were integrated using the Dormand-Prince DOP853 method (rtol $= 10^{-11}$, atol $= 10^{-14}$, $\Delta t = 0.002\,\text{s}$, $t_{\max} = 200\,\text{s}$). The same equations are implemented in `JAP_calculations.php` using 4th-order Runge-Kutta with identical parameters. Both give identical results to six significant figures.

7.1 Verified Numerical Results

Table 3: Complete verified values (Python/numpy and PHP agree).

Quantity	**Computed**	**Paper**	**Unit**	**Status**
Δ (discriminant)	30.2500	30.25	—	✓
ω_1^2	3.2500	3.25	$\text{rad}^2\text{s}^{-2}$	✓
ω_2^2	6.0000	6.00	$\text{rad}^2\text{s}^{-2}$	✓
ω_1	1.802776	1.802776	rad s^{-1}	✓
ω_2	2.449490	2.449490	rad s^{-1}	✓
f_1	0.286921	0.286921	Hz	✓
f_2	0.389848	0.389848	Hz	✓
ω_{beat} (theory)	0.646714	0.646714	rad s^{-1}	✓
T_{beat}	9.7156	9.7156	s	✓
$\lvert V_1(0)\rvert$	0.440000	0.440000	J	✓
$\Delta\mathcal{A}(1,0)$	1.000	1.000	Jb	✓
AAI(0)	1.000	1.000	Jb	✓
ω_{beat} (fitted)	0.646686	—	rad s^{-1}	✓
Deviation	**0.0043%**	—	—	✓
ε	0.252625	—	—	✓
φ	1.583850	—	rad	✓
AAI_0 (fitted)	1.815776	—	Jb	✓
RMSE (R1)	0.25550	—	Jb	✓
RMSE (heat)	0.40907	—	Jb	✓
Improvement	**37.54%**	—	—	✓

The R1 model recovers $\omega_{\text{beat}} = 0.646686\,\text{rad}\,\text{s}^{-1}$ from the simulation. The theory predicts $0.646714\,\text{rad}\,\text{s}^{-1}$ from the Hamiltonian eigenvalues alone. **Deviation:** 0.0043% — **1 part in 23,000.** This is not a coincidence. The beat frequency is an eigenvalue of the physical system; the R1 model recovers it directly from the AAI(t) signal. RMSE improvement over the heat equation: **37.54**%.

8 Rejection Analysis

8.1 What cannot be rejected

Theorem 6.2 uses four independently established premises: (1) Hamilton's equations (1835, undisputed); (2) normal-mode decomposition (linear algebra, undisputed); (3) product-to-sum identity (pure mathematics, undisputed); (4) virial theorem for $V \propto x^2$ (Clausius 1870, undisputed). No experiment can falsify correct mathematics derived from undisputed premises within their stated domain.

8.2 Domain conditions for experimental confirmation

Table 4: Domain conditions for Theorem R1. If any condition is violated, the system is outside the domain — not a disproof.

Condition	**Requirement**	**If violated**
Non-relativistic	$v \ll c$	Use relativistic framework
Weak damping	$\gamma \ll \omega_1 = 1.803$	Beat disappears before measurement window
$N \geq 2$ oscillators	At least 2 coupled	No beat by definition
Distinct frequencies	$\omega_1 \neq \omega_2$	Beat frequency is zero
Hamiltonian coupling	Conservative	Dissipative coupling modifies structure
Resolution	$\Delta E/E < 10^{-3}$	Modulation invisible below noise

9 Priority and Novelty

The following elements of the JAP have no prior publication in the physics literature to the author's knowledge: (1) the quantity $\mathcal{A}(i,t) = T_i/|V_i|$ as a named observable; (2) the

Virial Deviation Parameter $\Delta\mathcal{A}(i,t)$; (3) the Adal Asymmetry Index AAI(t); (4) the Jabbar unit [Jb]; (5) the Jabbar Vitality Theorem (biconditional); (6) Theorem R1 (oscillatory modulation of AAI).

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10 The JAP-Entropy Conjecture (Open Problem)

Conjecture 10.1 (JAP-Entropy Proportionality)**.** *In the zero-temperature limit ($T_{\text{bath}} \to 0$), during monotonic relaxation:*

$$\text{AAI}(t) \;\propto\; \frac{\sigma_{\text{ep}}(t)}{\langle T(t)\rangle}, \tag{10.1}$$

where σ_{ep} is the entropy production rate.

This conjecture is *not proved here*. Analytical justification via Onsager linear response and the Cauchy-Schwarz inequality is provided but is incomplete in the general dissipative case. Proof or disproof of this conjecture is the highest-value open problem in the JAP framework. If proved, it would connect AAI directly to irreversibility and non-equilibrium thermodynamics.

11 Conclusions

1. The JAP introduces the first formally named and defined kinetic-to-potential energy ratio $\mathcal{A}(i,t)$ [Jb] as a physical quantity, with its own unit — the Jabbar [Jb].

2. The Jabbar Vitality Theorem proves $\text{AAI} > 0\,\text{Jb}$ is necessary and sufficient for physical activity — logically distinct from the Second Law.

3. Theorem R1 derives from Hamilton's equations that AAI(t) follows an oscillatory modulation at $\omega_{\text{beat}} = |\omega_2 - \omega_1|$, not predicted by the heat equation.

4. Numerical verification confirms ω_{beat} to 0.0043% (1 part in 23,000), with 37.54% RMSE improvement over the heat equation.

5. All values match the supplementary PHP calculation file (`JAP_calculations.php`) exactly.

6. The JAP becomes a Law of Physics upon experimental confirmation of the oscillatory modulation in a coupled oscillator system satisfying the domain conditions of Section 2.

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Muhammad Umar Jabbar, son of the labourer Abdul Jabbar, was born on 1 February 2008 in 4/A.H, a small village in Khanewal, Punjab, Pakistan. He passed his FSc Pre-Medical examination with 852/1200 marks through Superior Group of Colleges, Khanewal Campus, and in his school examinations at Govt High School 2/A.H Khanewal he achieved 1006/1100.

His father Abdul Jabbar always worked hard as a labourer and chose to place books in his son's hands rather than send him to work. He carried the responsibilities of the household himself. Today his father is a heart patient and can no longer work to fulfil household expenses. His mother works in a neighbour's house for a salary of five thousand rupees per month to run the home. Muhammad Umar is the eldest son. His younger brother **Muhammad Usman Jabbar** is studying in First Year Pre-Medical at Govt Graduate College Khanewal. His youngest brother **Muhammad Sufyan** is in Class 3. He has two sisters in Class 4 and one sister who could not continue her education past Class 5 due to financial constraints.

Muhammad Umar always desired to become a doctor (MBBS) but high open merits and private fees made that dream impossible. He then pursued BSN Nursing but fees of ten lakh rupees again proved unaffordable. Despite all these difficulties — without a university, without a laboratory, without funding, without any institutional support — he studied the subject he had never enjoyed (Physics), proposed two theorems, proved them mathematically, and deposited them publicly on Zenodo with a permanent DOI. Higher chances are that these theorems will be experimentally confirmed and will become a Law of Physics.

He is believed to be the **youngest independent theoretical physics researcher in Pakistan** to propose and formally prove named theorems in non-relativistic Hamiltonian mechanics without any institutional support.

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