

Supplementary Information									
Bourassa J. D. The Quantized Dimensional Ledger for Metrology: Dimensional Closure, QMU Ledgers, and the Ontology of Physical Constants. J Theor Appl Phys 2026; 20(3): 310-318. https://doi.org/10.57647/jtap.2026.2004.05									
index	quantity	symbol	si_units	L1_exp	L2_exp	L3_exp	F1_exp	F2_exp	notes
1	Length	L	m	1	0	0	0	0	
2	Time	T	s	0	0	0	-1	0	
3	Frequency	f	s ⁻¹	0	0	0	1	0	
4	Mass	M	kg	0	0	1	0	1	
5	Coherence cell	A_cal	m ³ s ⁻²	0	0	1	0	2	
6	Speed of light	c	m s ⁻¹	1	0	0	1	0	
7	Planck constant	h	J s	0	0	1	0	1	
8	Reduced Planck constant	hbar	J s	0	0	1	0	1	
9	Elementary charge	e	C	0	03-Feb	01-Feb	0	03-Feb	
10	Vacuum permittivity	epsilon_0	F m ⁻¹	-1	-0.5	-0.5	0	-1	
11	Vacuum permeability	mu_0	NA ⁻²	-1	-0.5	-0.5	0	-1	
12	Coulomb constant	k_e	N m ² C ⁻²	-4	2	1	0	2	
13	Fine-structure constant	alpha	1	0	0	0	0	0	
14	Electron mass	m_e	kg	0	0	1	0	1	
15	Proton mass	m_p	kg	0	0	1	0	1	
16	Newtonian constant of gravitation	G	m ³ kg ⁻¹ s ⁻²	6	0	-1	-4	0	
17	Action quantum	S	J s	0	0	1	0	1	
18	Energy quantum	E	J	0	0	1	1	1	
19	Linear momentum	p	kg m s ⁻¹	1	0	1	1	1	
20	Force	F	N	1	0	1	2	1	

21	Area	A_geom	m ²	2	0	0	0	0	Geometric area
22	Volume	V_geom	m ³	3	0	0	0	0	Geometric volume
23	Velocity	v	m s ⁻¹	1	0	0	1	0	Generic speed scale
24	Acceleration	a	m s ⁻²	1	0	0	2	0	
25	Jerk	j	m s ⁻³	1	0	0	3	0	
26	Power (QMU)	P_Q	W	0	0	1	2	1	Power quantum based on QMU(E)
27	Pressure (QMU)	P_press	Pa	-1	0	1	2	1	
28	Energy density (QMU)	u_Q	J m ⁻³	-3	0	1	1	1	
29	Linear energy density	lambda_E	J m ⁻¹	-1	0	1	1	1	
30	Momentum density	g	kg m ⁻² s ⁻¹	-2	0	1	1	1	
31	Electric field	E_field	N C ⁻¹	1	-1.5	01-Feb	2	-0.5	
32	Magnetic field	B	T	0	-1.5	01-Feb	1	-0.5	
33	Electric potential	V	V	2	-1.5	01-Feb	2	-0.5	
34	Electric current	I	A	0	03-Feb	01-Feb	1	03-Feb	
35	Capacitance	C_cap	F	-1	03-Feb	01-Feb	-0.5	05-Feb	
36	Inductance	L_ind	H	0	-3	0	-1	-2	
37	Resistance	R	Ohm	2	03-Feb	01-Feb	1	03-Feb	
38	Conductance	G_cond	Ohm ⁻¹	-2	-1.5	-0.5	-1	-1.5	
39	Charge density	rho_q	C m ⁻³	-3	03-Feb	01-Feb	0	03-Feb	
40	Current density	J	A m ⁻²	-2	03-Feb	01-Feb	1	03-Feb	
41	Gravitational potential	Phi	J kg ⁻¹	0	0	0	1	0	
42	Gravitational field	g	m s ⁻²	1	0	0	2	0	

43	Gravitational potential energy (cell)	E_grav	J	0	0	1	1	1	QMU-normalized energy cell
44	Planck length (cell)	l_P	m	1	0	0	0	0	Length-type ledger cell
45	Planck time (cell)	t_P	s	0	0	0	-1	0	Time-type ledger cell
46	Planck mass (cell)	m_P	kg	0	0	1	0	1	Mass-type ledger cell
47	Planck energy (cell)	E_P	J	0	0	1	1	1	Energy-type ledger cell
48	Planck action (cell)	S_P	J s	0	0	1	0	1	Action-type ledger cell
49	Gravitational-wave strain	h_GW	1	0	0	0	0	0	Dimensionless strain
50	Spacetime curvature scalar	R_curv	m ⁻²	-2	0	0	0	0	
51	Electron Compton wavelength	lambda_Ce	m	1	0	0	0	0	
52	Electron Compton frequency	omega_Ce	s ⁻¹	0	0	0	1	0	
53	Rydberg constant	R_inf	m ⁻¹	-1	0	0	0	0	
54	Bohr radius	a_0	m	1	0	0	0	0	
55	Bohr period (cell)	T_B	s	0	0	0	-1	0	
56	Electron gyromagnetic ratio (cell)	gamma_e	s ⁻¹ T ⁻¹	0	0	0	0	1	
57	Flux quantum (cell)	Phi_0	Wb	0	03-Feb	01-Feb	0	-0.5	
58	Photon energy (cell)	E_gamma	J	0	0	1	1	1	
59	Photon momentum (cell)	p_gamma	kg m s ⁻¹	1	0	1	1	1	
60	Wavevector magnitude	k	m ⁻¹	-1	0	0	0	0	

61	Boltzmann constant (cell)	k_B	JK^{-1}	0	0	1	1	1	Kelvin treated as dimensionless scaling
62	Thermodynamic temperature (scale)	T_K	K	0	0	0	0	0	Dimensionless under QDL; energy carried by k_B
63	Entropy / k_B	S_over_kB	1	0	0	0	0	0	Dimensionless entropy measure
64	Thermodynamic entropy (cell)	S_th	JK^{-1}	0	0	1	1	1	Entropy scale via k_B T
65	Heat capacity (cell)	C_V	JK^{-1}	0	0	1	1	1	
66	Equation-of-state parameter	w_EOS	1	0	0	0	0	0	
67	Dimensionless spectral amplitude	Delta2	1	0	0	0	0	0	
68	Refractive index	n_refr	1	0	0	0	0	0	
69	Relative permittivity	epsilon_r	1	0	0	0	0	0	
70	Relative permeability	mu_r	1	0	0	0	0	0	
71	Poynting flux (cell)	S_P	W m^{-2}	1	-1.5	01-Feb	3	-1.5	
72	Electromagnetic energy density (cell)	u_EM	J m^{-3}	-1	-0.5	03-Feb	4	-2	
73	Magnetic energy density (cell)	u_B	J m^{-3}	-1	-1.5	03-Feb	2	-1	
74	Electric displacement field	D	C m^{-2}	0	-2	0	2	-1.5	
75	Magnetic field H	H	A m^{-1}	1	03-Feb	01-Feb	1	05-Feb	
76	Electric polarization	P_pol	C m^{-2}	-2	03-Feb	01-Feb	0	03-Feb	

77	Magnetization	M_mag	A m ⁻¹	0	03-Feb	01-Feb	1	03-Feb	
78	Electrical conductivity (cell)	sigma	S m ⁻¹	2	03-Feb	01-Feb	1	03-Feb	
79	Electrical resistivity (cell)	rho_res	Ohm m	-2	-1.5	-0.5	-1	-1.5	
80	Skin depth (cell)	delta_skin	m	1	0	0	0	0	
81	Vacuum impedance	Z_0	Ohm	0	0	0	0	0	
82	Normalized vacuum impedance	Z_0_norm	1	0	0	0	0	0	Z0 normalized by characteristic scales
83	Effective fine-structure constant	alpha_eff	1	0	0	0	0	0	
84	Gravitational coupling parameter	alpha_G	1	0	0	0	0	0	
85	Electronâ€“proton mass ratio	m_e_over_m_p	1	0	0	0	0	0	
86	Classical electron radius	r_e	m	1	0	0	0	0	
87	Thomson cross-section	sigma_T	m ²	2	0	0	0	0	
88	Bohr magneton (cell)	mu_B	J T ⁻¹	0	03-Feb	01-Feb	0	03-Feb	
89	Nuclear magneton (cell)	mu_N	J T ⁻¹	0	03-Feb	01-Feb	0	03-Feb	
90	NV-center zero-field splitting	D_NV	s ⁻¹	0	0	0	1	0	
91	Resonator quality factor	Q_res	1	0	0	0	0	0	
92	Lab-scale strain amplitude	h_lab	1	0	0	0	0	0	
93	QDL closure invariant	C_QDL	1	0	0	0	0	0	
94	Torque (cell)	tau	N m	2	0	1	2	1	
95	Angular momentum (cell)	J_ang	J s	0	0	1	0	1	
96	NV-center energy splitting	E_NV	J	0	0	1	1	1	
97	Scalarâ€“tensor coupling parameter	beta_ST	1	0	0	0	0	0	

98	Universal Tension Parameter (cell)	Gamma	$N m^{-1}$	0	0	1	2	1	
99	Curvature-tension ratio	ξ_{CT}	1	0	0	0	0	0	
100	Ledger consistency index	I_{QDL}	1	0	0	0	0	0	