















ERRATUM | DECEMBER 23 2024

Erratum: “Impulse coupling measurement of metallic and carbon targets during laser ablation through ballistic pendulum experiments and simulations” [J. Appl. Phys. 135, 163101 (2024)]

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Impulse coupling measurement of metallic and carbon targets during laser ablation through ballistic pendulum experiments and simulations

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The authors have realized that in their last work titled “Impulse coupling measurement of metallic and carbon targets during laser ablation through ballistic pendulum experiments and simulations,”¹ they made a small mistake in the calculation of the pendulum parameters, which changes the momentum results given in the article “Impulse coupling measurement of metallic and carbon targets during laser ablation through ballistic pendulum experiments and simulations.” The error affects, although very lightly, the values given in Table III and, by extension, Figs. 5(a), 5(b), 6, 7, 10, 11, 15(a), and 15(b).

The values given in Secs. III A and V for the deviation between the momentum calculated from the PDV experiments and

the pendulum deflection angle measurements must also be corrected. The average deviation between the two methods is 5.8% spread over 20 shots on aluminum and 5.9% when all materials are considered (44 shots in total). The deviations between the experimental and simulated results given in Secs. IV and V must be corrected. The deviation for the shots of the ELFIE2018 campaign is 26.7%, while that for the LULI2020 and LULI2021 shots is 54.3%. The total deviation over all shots is 34.7%.

This change does not affect the conclusions of the article and, actually, brings the experimental results closer to the simulation results.

All the corrected figures as well as the updated table of values are shown below:

TABLE III. Data used for this study.

Material	Campaign	E J	I GW/cm ²	λ nm	τ ns	mm	Q_{PDV}	Q_{Def} N s	Q_{Sim}	C_{mpdv}	C_{mDef} N/MW	C_{msim}
Al	ELFIE2018	11.43	859.5	1057	0.08	4.6	9.235×10^{-5}	9.099×10^{-5}	1.134×10^{-4}	8.08	7.96	9.93
Al	ELFIE2018	1.54	116.1	1057	0.08	4.6	1.570×10^{-5}	1.455×10^{-5}	2.022×10^{-5}	10.17	9.43	13.10
Al	ELFIE2018	4.64	349.0	1057	0.08	4.6	4.340×10^{-5}	4.716×10^{-5}	5.311×10^{-5}	9.36	10.17	11.45
Al	ELFIE2018	10.73	807.2	1057	0.08	4.6	1.015×10^{-4}	9.246×10^{-5}	1.056×10^{-4}	9.47	8.62	9.84
Al	ELFIE2018	1.18	88.8	1057	0.08	4.6	1.477×10^{-5}	1.408×10^{-5}	1.610×10^{-5}	12.52	11.93	13.64
Al	ELFIE2018	0.61	46.2	1057	0.08	4.6	9.235×10^{-6}	9.899×10^{-6}	9.306×10^{-6}	15.05	16.13	15.17
Al	ELFIE2018	0.28	21.1	1057	0.08	4.6	5.541×10^{-6}		4.122×10^{-6}	19.74		14.68
Al	ELFIE2018	0.45	34.1	1057	0.08	4.6	8.311×10^{-6}	9.358×10^{-6}	7.911×10^{-6}	18.33	20.64	17.45
Al	ELFIE2018	15.40	115.8	1057	0.56	5.5	2.955×10^{-4}	2.873×10^{-4}	1.641×10^{-4}	19.18	18.65	10.65
Al	ELFIE2018	43.99	330.7	1057	0.56	5.5	4.991×10^{-4}	4.409×10^{-4}	4.02×10^{-4}	11.35	10.02	9.13
Al	ELFIE2018	4.87	36.6	1057	0.56	5.5	8.312×10^{-5}	8.566×10^{-5}	6.220×10^{-5}	17.08	17.60	12.78
Al	ELFIE2018	1.32	10.0	1057	0.56	5.5	3.417×10^{-5}	3.400×10^{-5}	2.347×10^{-5}	25.80	25.67	17.72
Al	ELFIE2018	0.46	3.5	1057	0.56	5.5	1.201×10^{-5}	1.098×10^{-5}		25.94	23.73	
Al	ELFIE2018	11.45	86.1	528.5	0.56	5.5	1.570×10^{-4}	1.497×10^{-4}	1.605×10^{-4}	13.71	13.07	14.02
Al	ELFIE2018	12.97	97.5	528.5	0.56	5.5	1.478×10^{-4}	1.353×10^{-4}	1.741×10^{-4}	11.39	10.43	13.42
Al	ELFIE2018	3.05	22.9	528.5	0.56	5.5	4.618×10^{-5}	4.312×10^{-5}	7.336×10^{-5}	15.13	14.13	24.04
Al	ELFIE2018	2.13	16.0	528.5	0.56	5.5	3.048×10^{-5}	2.798×10^{-5}	5.809×10^{-5}	14.31	13.14	27.28
Al	LULI2020	708.20	6142.0	1053	15	0.9	3.984×10^{-3}		1.894×10^{-3}	5.63		2.67
Al	LULI2020	660.90	5731.8	1053	15	0.9	3.609×10^{-3}		1.794×10^{-3}	5.46		2.71
Al	LULI2020	735.70	6380.5	1053	15	0.9	4.052×10^{-3}	4.025×10^{-3}	2.038×10^{-3}	5.51	5.47	2.77
Al	LULI2020	454.80	3944.3	1053	15	0.9	2.728×10^{-3}	2.735×10^{-3}	1.239×10^{-3}	6.00	6.01	2.72
Al	LULI2020	122.50	1062.4	1053	15	0.9	9.143×10^{-4}	8.932×10^{-4}	4.055×10^{-4}	7.46	7.29	3.31
Al	LULI2020	235.90	2045.9	1053	15	0.9	1.564×10^{-3}	1.480×10^{-3}	6.861×10^{-4}	6.63	6.27	2.91
Al	LULI2021	793.63	7194.7	1053	15	0.9	5.308×10^{-3}		2.151×10^{-3}	6.69		2.71
EDM3	ELFIE2018	45.08	316.2	1057	0.56	5.5		1.238×10^{-4}			2.75	
EDM3	ELFIE2018	4.21	29.5	1057	0.56	5.5	8.312×10^{-5}	9.095×10^{-5}		19.73	21.59	
EDM3	ELFIE2018	1.29	9.1	1057	0.56	5.5	4.987×10^{-5}	4.661×10^{-5}		38.62	36.10	
EDM3	ELFIE2018	0.51	3.6	1057	0.56	5.5	3.417×10^{-5}	3.104×10^{-5}		66.86	60.73	
EDM3	LULI2020	587.00	5090.9	1053	15	0.9	3.309×10^{-3}	3.480×10^{-3}		5.64	5.93	
EDM3	LULI2020	280.10	2429.2	1053	15	0.9	1.794×10^{-3}	1.726×10^{-3}		6.41	6.16	
EDM3	LULI2020	124.80	1082.4	1053	15	0.9	1.025×10^{-3}	1.016×10^{-3}		8.21	8.14	
EDM3	LULI2020	484.70	4203.6	1053	15	0.9	2.819×10^{-3}	3.051×10^{-3}		5.82	6.30	
EDM3	LULI2021	790.38	6760.1	1053	15	0.9	3.416×10^{-3}			4.32		
EDM3M	LULI2020	727.70	6311.1	1053	15	0.9	4.194×10^{-3}	4.583×10^{-3}		5.76	6.30	
EDM3M	LULI2020	362.50	3143.8	1053	15	0.9	2.470×10^{-3}	2.694×10^{-3}		6.81	7.43	
EDM3M	LULI2020	492.40	4270.4	1053	15	0.9	3.076×10^{-3}	3.132×10^{-3}		6.25	6.36	
EDM3M	LULI2020	72.40	627.9	1053	15	0.9	6.058×10^{-4}	5.935×10^{-4}		8.37	8.20	
EDM3M	LULI2020	158.10	1371.1	1053	15	0.9	1.165×10^{-3}			7.37		
EDM3M	LULI2020	487.80	4230.5	1053	15	0.9	3.122×10^{-3}	3.266×10^{-3}		6.40	6.70	
EDM3M	LULI2021	823.90	7145.4	1053	15	0.9	3.699×10^{-3}			4.49		
EDM3M	LULI2021	456.81	3901.9	1053	15	0.9	2.791×10^{-3}			6.11		
EDM3M	LULI2021	786.19	6804.8	1053	15	0.9	3.580×10^{-3}			4.55	5.06	
Au	ELFIE2018	5.07	381.42	1057	0.08	4.6	8.313×10^{-5}	8.655×10^{-5}		16.39	17.07	
Au	ELFIE2018	11.00	827.71	1057	0.08	4.6	1.663×10^{-4}	1.787×10^{-4}		15.11	16.24	
Au	ELFIE2018	1.62	121.78	1057	0.08	4.6	2.494×10^{-5}	2.654×10^{-5}		15.40	16.39	
Au	ELFIE2018	4.48	337.05	1057	0.08	4.6	6.928×10^{-5}	7.372×10^{-5}		15.46	16.45	
Au	ELFIE2018	1.37	103.24	1057	0.08	4.6	2.125×10^{-5}	2.294×10^{-5}		15.48	16.71	
Au	ELFIE2018	0.49	36.48	1057	0.08	4.6	8.313×10^{-6}	9.436×10^{-6}		17.14	19.46	
Au	ELFIE2018	0.40	29.99	1057	0.08	4.6	1.016×10^{-5}			25.48		
Au	ELFIE2018	12.28	86.17	1057	0.6	5.5		3.201×10^{-4}			26.06	
Au	ELFIE2018	41.89	293.84	1057	0.6	5.5	3.602×10^{-4}	3.360×10^{-4}		8.60	8.02	
Au	ELFIE2018	4.20	29.47	1057	0.6	5.5		1.176×10^{-4}			28.00	

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TABLE III. (Continued.)

Material	Campaign	E J	I GW/cm ²	λ nm	τ ns	mm	Q_{PDV}	Q_{Def} N s	Q_{Sim}	C_{mPDV}	C_{mDef} N/MW	C_{mSim}
Au	ELFIE2018	1.29	9.07	1057	0.6	5.5	3.787×10^{-5}	3.782×10^{-5}		29.31	29.26	
Au	ELFIE2018	0.48	3.39	1057	0.6	5.5	8.313×10^{-6}	7.641×10^{-6}		17.18	15.79	
Au	ELFIE2018	12.00	84.18	528.5	0.6	5.5	2.586×10^{-4}	2.349×10^{-4}		21.55	19.58	
Au	ELFIE2018	2.80	19.62	528.5	0.6	5.5	6.928×10^{-5}	6.184×10^{-5}		24.77	22.11	
Au	ELFIE2018	1.90	13.30	528.5	0.6	5.5	5.173×10^{-5}	5.058×10^{-5}		27.29	26.68	
Sn	LULI2021	347.73	3633.4	1053	15	0.9	2.724×10^{-3}			7.83		
Cu	LULI2021	757.51	6570.0	1053	15	0.9	4.476×10^{-3}			5.91		
Cu	LULI2020	482.60	4185.4	1053	15	0.9	3.044×10^{-3}			6.31		

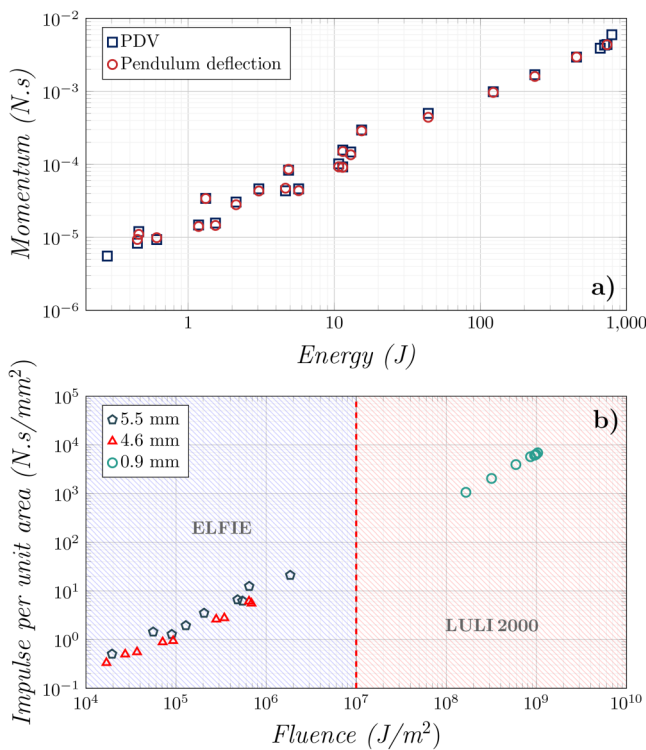


FIG. 5. (a) Momentum Q depending on laser energy E for the shots on aluminum targets. The results are given for the PDV and the pendulum deflection calculation methods. The results come from the ELFIE2018, LULI2020, and LULI2021 campaigns. The uncertainties are estimated to be 5% for the laser energy and 10% for the momentum. (b) Impulse per unit area depending on the laser fluence for the shots on aluminum targets; only the PDV results are presented and separated depending on the laser spot size used during the experiments.

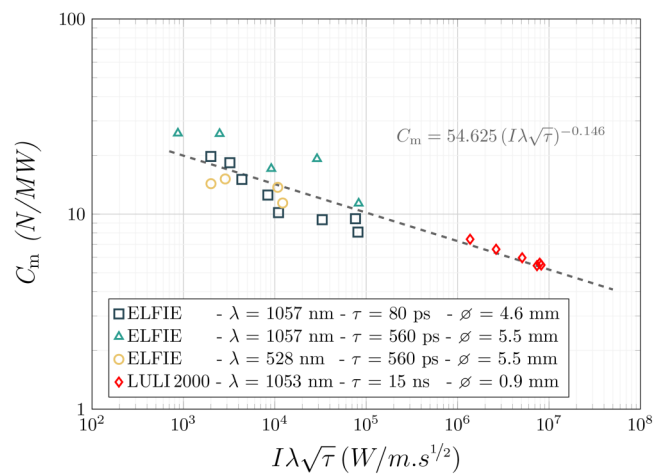


FIG. 6. Momentum coupling (N/MW) depending on $I\lambda\sqrt{\tau}$ calculated for each experimental campaign conducted on aluminum targets. Each set of laser parameters is separated for better visualization. The overall fit is shown as a dashed line.

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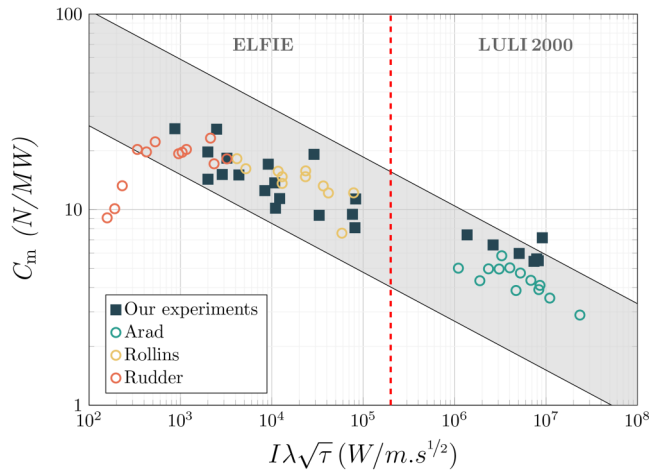


FIG. 7. Momentum coupling (N/MW) depending on $I\lambda\sqrt{\tau}$ calculated for each experimental campaign conducted on aluminum targets compared to Phipps' simplified model and other experimental results from Rudder,² Arad *et al.*,³ and Rollins (via McKay and Laufer).⁴

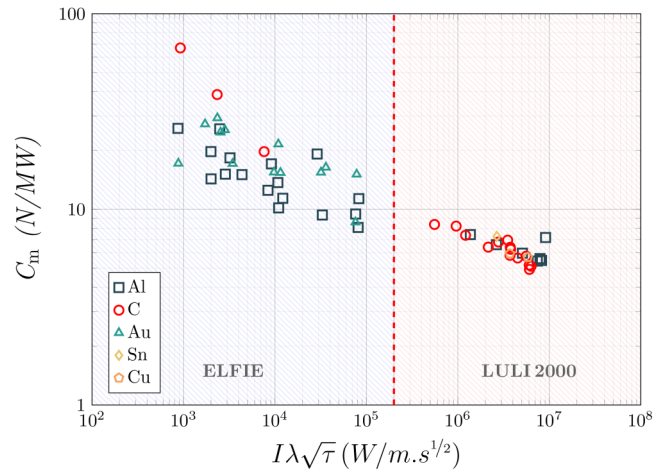


FIG. 11. Momentum coupling depending on $I\lambda\sqrt{\tau}$ for aluminum, carbon, gold, tin, and copper.

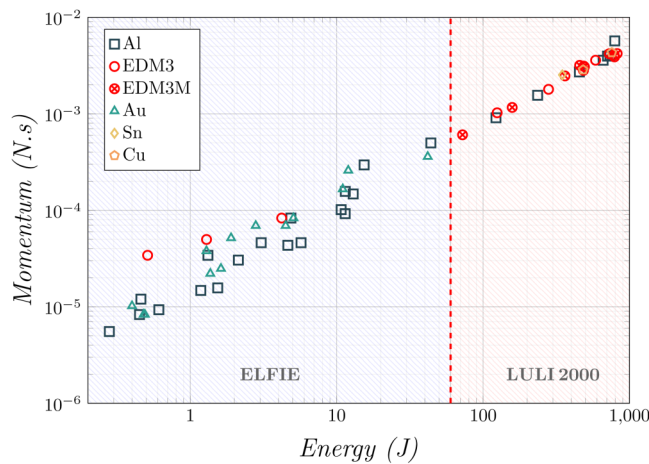


FIG. 10. Momentum depending on the energy for aluminum, carbon, gold, tin, and copper.

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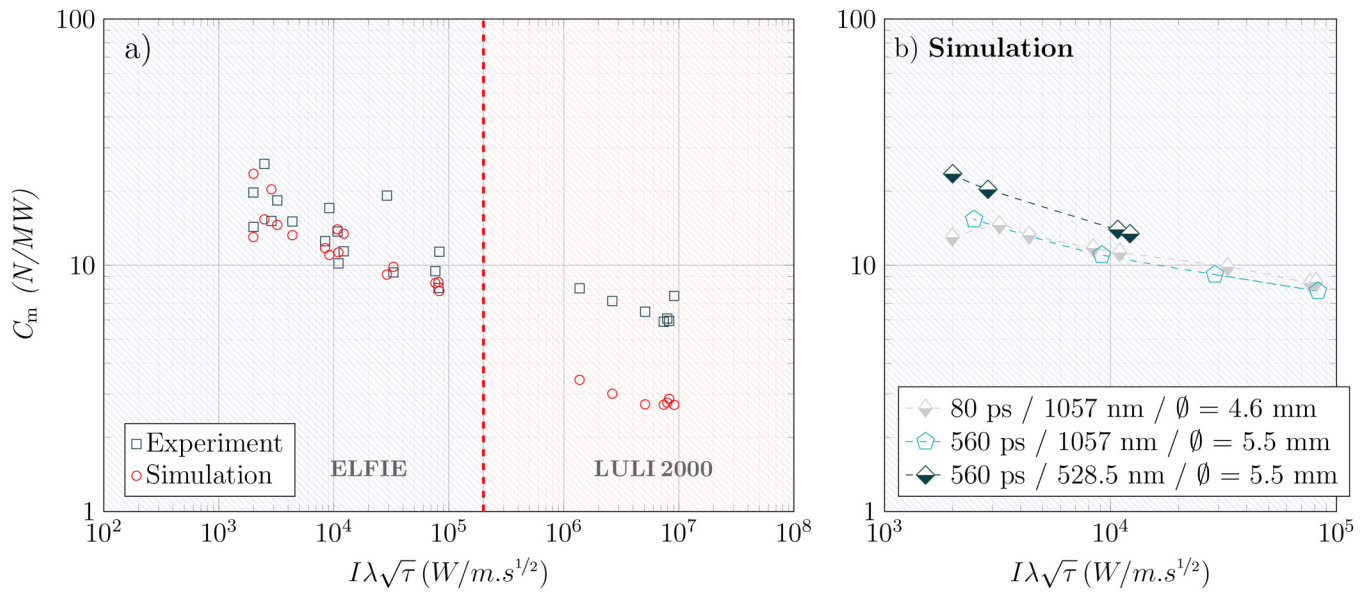


FIG. 15. (a) Momentum coupling depending on $I\lambda\sqrt{\tau}$ for the experimental and simulated results. (b) Focus on the simulation results of the ELFIE2018 campaign depending on the laser parameters.

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