Statistical behaviour of Laser-Induced Plasma and its complementary characteristic signals

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Supplementary data

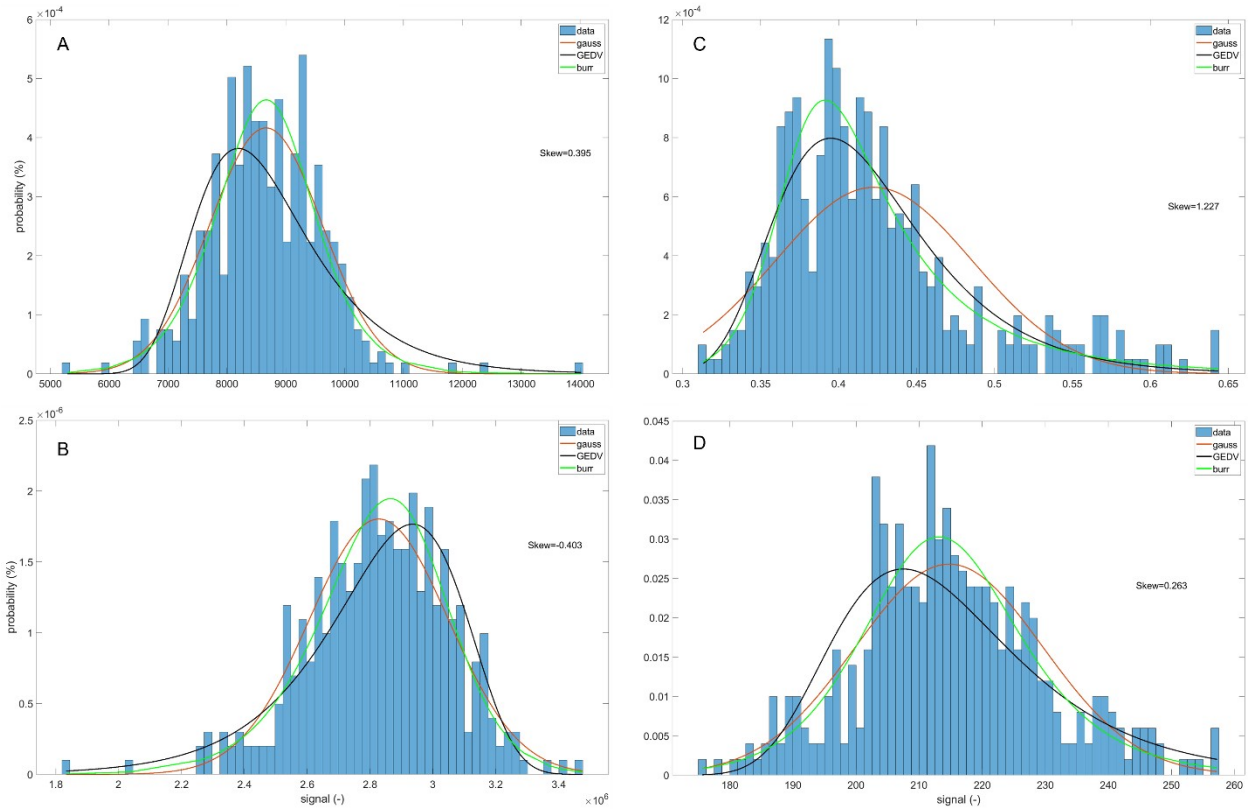

Figure 1S: CDF of Fe I 373.49 nm (A); total spectral intensity (B); size of the plasma plume (C); and sound intensity (D). Irradiance is 6.25 GW/cm². The data set is 400 points for each observed parameter.

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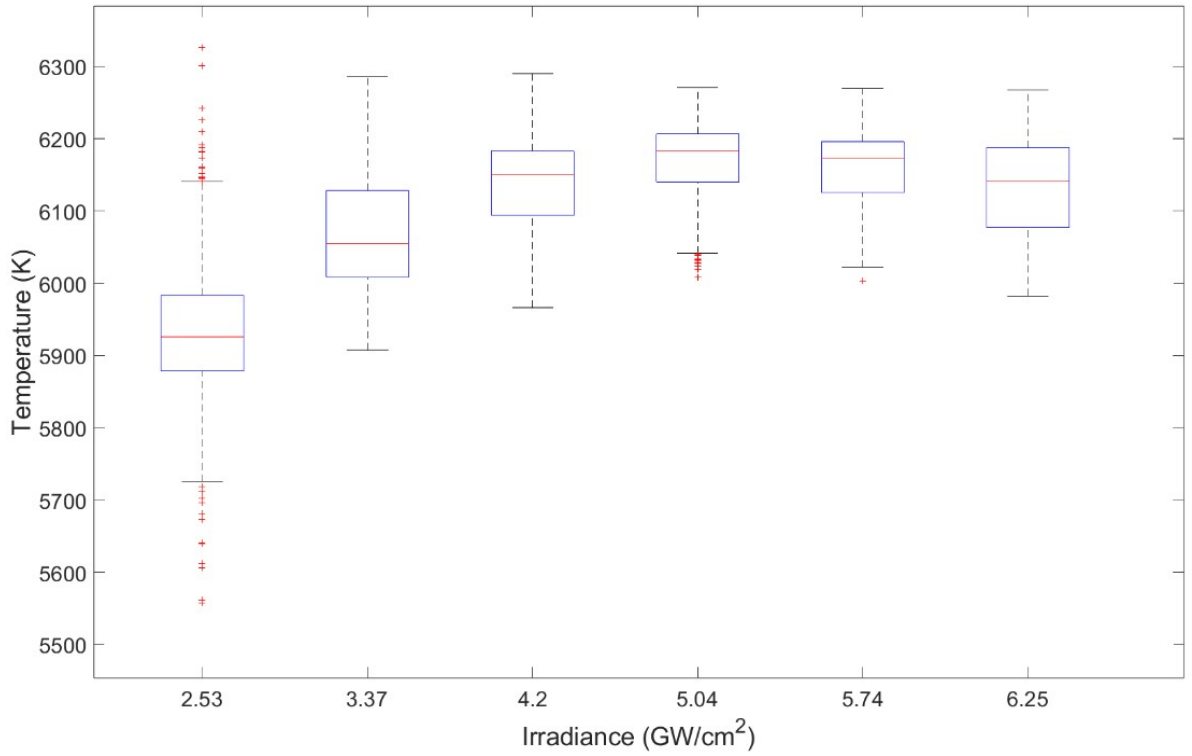

Figure 2S: Temperature of the plasma plume dependence on the laser irradiance (A). The data set is 900 data points. 1.72 GW/cm^2 is missing compared to the 400 data set.

Table 1S: Results of Kolmogorov-Smirnov Test comparing Gaussian. GEV. and Burr distribution. and skewness of the selected data for all the measured irradiances. The data set is 900 data points. hence the Kolmogorov-Smirnov condition D=0.0453. The highlighted values represent fulfilling the null hypothesis of a specific model for individual laser irradiances.

Signal	*Irradiance (GW/cm^2)*	*Gauss*	*GEV*	*Burr*
Plasma plume	2.53	***0.0400***	*0.0689*	***0.0411***
	3.37	***0.0411***	0.0589	0.0478
	4.20	*0.0512*	0.0679	**0.0437**
	5.04	*0.0654*	0.0654	0.0491
	5.74	*0.0675*	0.0573	**0.0429**
	6.25	*0.0667*	**0.0411**	0.0456
Sound intensity	2.53	*0.0467*	0.0756	0.0537
	3.37	*0.0478*	0.0767	0.0478
	4.20	*0.0533*	0.0511	**0.0400**
	5.04	*0.0644*	**0.0389**	0.0522
	5.74	*0.0589*	0.0533	0.0589
	6.25	*0.0644*	**0.0344**	**0.0433**
Fe I 373.49 nm	2.53	*0.0756*	0.0478	**0.0433**
	3.37	*0.0567*	0.0533	0.0578
	4.20	*0.0856*	**0.0278**	**0.0422**
	5.04	*0.0633*	0.0778	**0.0411**
	5.74	*0.0711*	0.1711	**0.0322**
	6.25	*0.0500*	0.0533	0.0589
Cu I 324.74	2.53	*0.0633*	0.0511	**0.0378**
	3.37	*0.0478*	0.0600	0.0567
	4.20	*0.0867*	**0.0222**	**0.0389**
	5.04	*0.0744*	0.1811	**0.0356**

	5.74	*0.0722*	0.1778	**0.0344**
	6.25	*0.0467*	0.0633	0.0511
Ni I 352.44	2.53	*0.0744*	0.0478	**0.0356**
	3.37	*0.0478*	0.0544	0.0500
	4.20	*0.0922*	**0.0244**	**0.0389**
	5.04	*0.0744*	0.1878	**0.0367**
	5.74	*0.0811*	0.1756	0.0456
	6.25	*0.0467*	**0.0444**	0.0449
Total sp. intensity	2.53	*0.0689*	0.0456	0.0544
	3.37	*0.0511*	0.0544	0.0511
	4.20	*0.0539*	0.0598	0.0479
	5.04	*0.0767*	0.0711	**0.0367**
	5.74	*0.0867*	0.0722	**0.0378**
	6.25	***0.0444***	0.0644	0.0500
Average		*0.0628*	0.0714	**0.0453**

Table 2S: Results of Kolmogorov-Smirnov Test comparing Gaussian. GEV. and Burr distribution. and skewness of the selected data for all the measured irradiances. The original data set is 400 data points, with randomly averaging 5 data points for each observation individually, resulting in 80 data points. Hence the Kolmogorov-Smirnov condition D=0.1520. The highlighted values represent fulfilling the null hypothesis of a specific model for individual laser irradiances.

Signal	*Irradiance (GW/cm²)*	*Gauss*	*GEV*	*Burr*
Plasma plume	1.72	**0.1375**	**0.1250**	**0.1250**
	2.53	0.1750	**0.1125**	**0.1250**
	3.37	**0.1125**	**0.1500**	0.1625
	4.20	**0.1250**	**0.1125**	**0.1500**
	5.04	0.1625	**0.1125**	0.1625
	5.74	0.1750	**0.1125**	**0.1500**
	6.25	**0.1125**	**0.1500**	**0.1375**
Sound intensity	1.72	**0.1250**	**0.1250**	**0.1250**
	2.53	**0.1250**	**0.1375**	**0.1250**
	3.37	**0.0875**	**0.1500**	**0.1250**
	4.20	**0.1375**	0.1625	**0.1375**
	5.04	**0.1500**	**0.1125**	**0.1500**
	5.74	**0.1375**	0.2125	**0.1000**
	6.25	**0.1125**	**0.1500**	**0.1375**
Fe I 373.49 nm	1.72	**0.1375**	**0.1000**	**0.1250**
	2.53	**0.1000**	**0.1250**	**0.1500**
	3.37	**0.0875**	**0.1250**	**0.1500**
	4.20	0.1625	**0.1250**	**0.1500**
	5.04	0.1625	**0.1250**	**0.1375**
	5.74	0.1750	**0.1375**	**0.1375**
	6.25	0.1625	**0.1250**	**0.1375**
Cu I 324.74 nm	1.72	**0.1000**	**0.1125**	**0.1375**
	2.53	**0.1125**	**0.1375**	**0.1500**
	3.37	**0.1000**	**0.1250**	**0.1375**
	4.20	**0.1250**	**0.1125**	**0.1500**
	5.04	**0.1250**	**0.1000**	**0.1500**
	5.74	0.1875	**0.1250**	**0.1375**
	6.25	**0.1500**	**0.1375**	**0.1125**
Ni I 352.44 nm	1.72	**0.1000**	**0.1250**	**0.1500**
	2.53	**0.1125**	**0.1250**	**0.1500**
	3.37	**0.1000**	**0.1375**	**0.1375**
	4.20	**0.1375**	**0.1125**	**0.1375**
	5.04	0.1750	**0.1000**	**0.1375**
	5.74	0.2125	**0.1500**	**0.1375**
	6.25	0.1875	**0.1250**	**0.1500**
Total sp. intensity	1.72	0.1750	**0.1000**	**0.1250**
	2.53	**0.1250**	**0.1375**	0.1625
	3.37	**0.1250**	**0.1500**	0.1750
	4.20	**0.1500**	**0.1375**	**0.1500**
	5.04	**0.1500**	**0.1000**	**0.1375**
	5.74	**0.1500**	**0.1375**	**0.1375**
	6.25	**0.1500**	**0.1375**	**0.1375**
Average		**0.1384**	**0.1289**	**0.1405**

Table 3S: Results of Kolmogorov-Smirnov Test comparing Gaussian. GEV. and Burr distribution. and skewness of the selected data for all the measured irradiances. The original data set is 900 data points, with randomly averaging 4 data points for each observation individually, resulting in 225 data points. Hence the Kolmogorov-Smirnov condition D=0.0907. The highlighted values represent fulfilling the null hypothesis of a specific model for individual laser irradiances.

Signal	*Irradiance (GW/cm^2)*	*Gauss*	*GEV*	*Burr*
Plasma plume	2.53	**0.0667**	0.0978	**0.0622**
	3.37	**0.0711**	0.0933	**0.0756**
	4.20	**0.0756**	**0.0622**	**0.0844**
	5.04	0.0933	0.1022	**0.0667**
	5.74	**0.0733**	0.0919	**0.0642**
	6.25	**0.0533**	**0.0889**	**0.0622**
Sound intensity	2.53	**0.0533**	**0.0711**	**0.0667**
	3.37	**0.0489**	0.0933	**0.0667**
	4.20	**0.0622**	**0.0756**	**0.0667**
	5.04	0.1200	**0.0622**	**0.0533**
	5.74	**0.0889**	**0.0800**	**0.0667**
	6.25	**0.0711**	**0.0844**	**0.0800**
Fe I 373.49 nm	2.53	**0.0844**	**0.0844**	**0.0578**
	3.37	**0.0889**	0.1244	**0.0844**
	4.20	0.0933	**0.0667**	**0.0578**
	5.04	0.1111	**0.0889**	**0.0533**
	5.74	**0.0800**	**0.0889**	**0.0622**
	6.25	**0.0711**	0.0933	**0.0622**
Cu I 324.74	2.53	**0.0667**	**0.0756**	**0.0667**
	3.37	**0.0667**	0.0978	**0.0889**
	4.20	0.1022	**0.0711**	**0.0622**
	5.04	0.0933	**0.0844**	**0.0622**
	5.74	**0.0889**	0.1200	**0.0622**
	6.25	**0.0578**	0.1067	0.0933
Ni I 352.44	2.53	**0.0711**	**0.0889**	**0.0711**
	3.37	**0.0667**	0.1067	**0.0889**
	4.20	**0.0667**	0.1067	**0.0889**
	5.04	**0.0889**	0.1556	**0.0622**
	5.74	**0.0800**	0.1067	**0.0711**
	6.25	**0.0622**	**0.0889**	**0.0711**
Total sp. intensity	2.53	**0.0800**	**0.0711**	**0.0667**
	3.37	**0.0711**	0.0933	**0.0844**
	4.20	**0.0800**	**0.0622**	**0.0622**
	5.04	0.1022	**0.0667**	**0.0533**
	5.74	0.1067	**0.0844**	**0.0711**
	6.25	**0.0533**	**0.0756**	**0.0800**
Average		0.0781	0.0892	0.0694