

Database (Atomic targets)

- 706 collision cases (44 projectiles and 73 targets),
- 36544 experimental data points.
- 1190 publications covering the period 1928-2023.

Preliminary preparation

- Significant effort was devoted to reorganizing the database, unifying the units, and arranging the data in a standard (csv) format

Cleaning criterions

- Experimental errors were not considered (The raw data show much larger discrepancies).
- The clustering-based algorithm reduced the original 36000 data points to 28000 values.

Comparison with “Random Forest” NN (2020)

$$\text{MAPE} \equiv \frac{100}{n} \sum \left| \frac{y_{\text{true}} - y_{\text{pred}}}{y_{\text{true}}} \right| .$$

Ions	Test	
	RF	ESPNN
H	12	4.5
He	9.1	4.1
Li	25	7.7
Be-U	12	7.1
All	23	5.7

MAPE: mean absolute percentage error

Comparison with SRIM (2013)

Predictive MAPE of the SRIM code and the Neural Network ESPNN model **trained only with data collected before 2013.**

	>2013		>2015		>2017		>2019	
Ions	ESPNN	SRIM	ESPNN	SRIM	ESPNN	SRIM	ESPNN	SRIM
H	7.0	19.2	4.6	15.3	6.6	13.3	3.5	7.1
He	8.4	10.6	9.3	10.1	9.3	10.1	5.5	8.3
Be-U	6.2	6.6	5.4	6.5	5.3	6.3		
all	7.0	11.4	6.0	9.8	6.8	8.9	4.1	7.4