

---

# Supplementary: Learning Physical Constraints with Neural Projections

---

Anonymous Author(s)

Affiliation

Address

email

## 1 A Animated Video

2 We refer the readers to the supplementary video for the animated results of all examples.

## 3 B Additional Implementation Details

### 4 B.1 Training Data

5 We provide all the information for the training dataset in Table 1 and Figure 1. The time step used for all the training examples is  $dt = 0.1s$ .

Table 1: Training Data Details

Model	#Samples	#Frames per Sample
Rigid-1	2048	20
Rigid-2	8192	20
Rope	4096	32
Articulated	6000	32
Collisions	8192	32

6

### 7 B.2 Network Architectures and Training Details

8 All the models use LeakyReLU as the activation function and use fully-connected layers as the basic  
9 units. They are trained using ADAM optimizer, with different training parameters as shown in Table  
10 2.

Table 2: Network Architectures and Training Details

Model	Architecture	Batch size	Init_lr	lr_step	lr_gamma	Epoch	Iter
Rigid-1	[8, 256, 256, 256, 256, 1]	256	1e-3	20	0.8	600	5
Rigid-2	[8, 256, 256, 256, 256, 1]	512	1e-3	20	0.8	1000	8
Rope	[8, 256, 256, 256, 256, 1]	256	1e-3	20	0.8	1000	10
Articulated	[8, 256, 256, 256, 256, 1]	512	1e-3	20	0.8	1000	8
Collisions	[8, 512, 512, 512, 512, 1]	256	1e-3	20	0.8	1000	10

## 11 C Additional Visualization for Training and Prediction

12 Here we provide additional visualizations as in Figure 1 and Figure 2 to demonstrate the training data  
 13 and predicted process. We refer the readers to the video for more detailed illustrations.

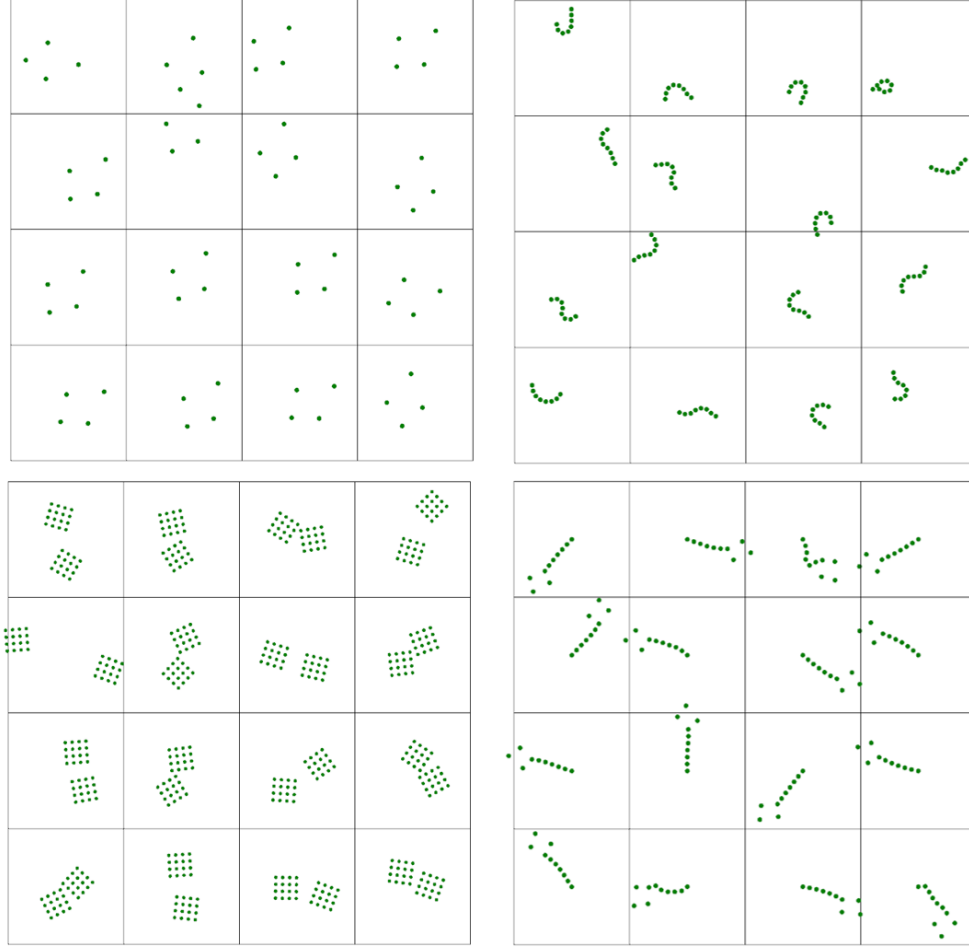


Figure 1: We used a dataset composed of different types of physics simulations on points. Each simulation was run with some randomized parameters for a short time period. The simulations include four-point rigid body (top left), short rod (top right), collision and contact (bottom left) and articulation (bottom right). All the simulations (and the predictions) took large time steps to showcase the stability of our algorithm.

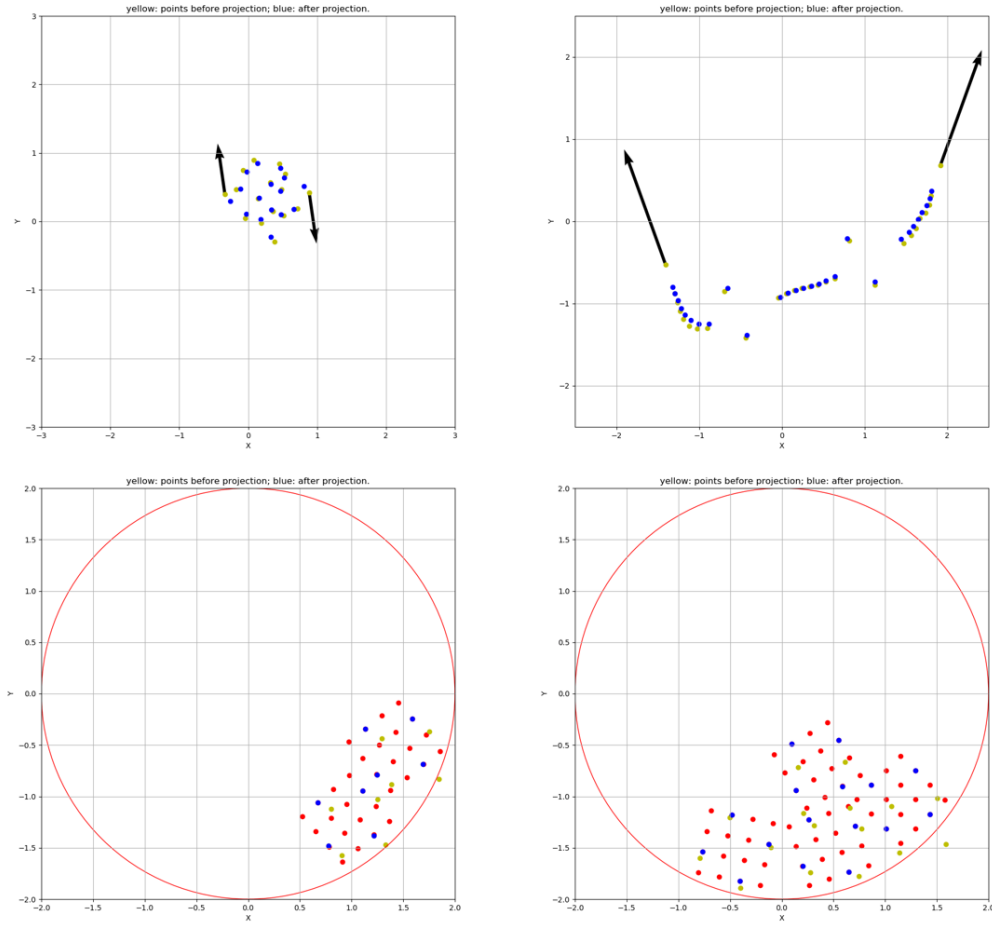


Figure 2: The visualization of the predicted points (yellow) and the neural projected points (blue) for different examples, including rigid (top left), articulated body (top right), collision between two bodies (bottom left) and collision between multiple bodies (bottom right). The red dots visualize the additional points used in generating simulation data.