

# Wrap-Up

## Stranger things two ball on string (Two Ball String Experiment)

Presented by  
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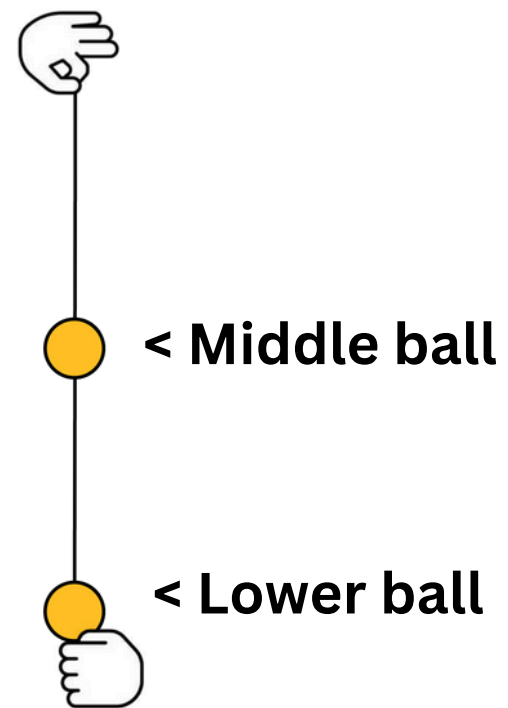
*09/06/2024*



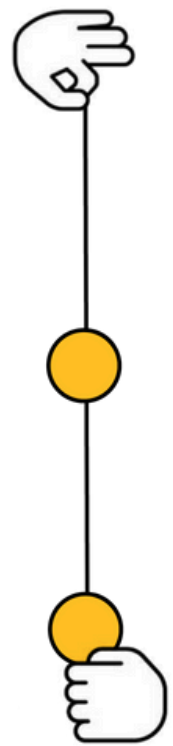
# Experimental goal

- observe the behavior of rotational Two Ball String in microgravity.

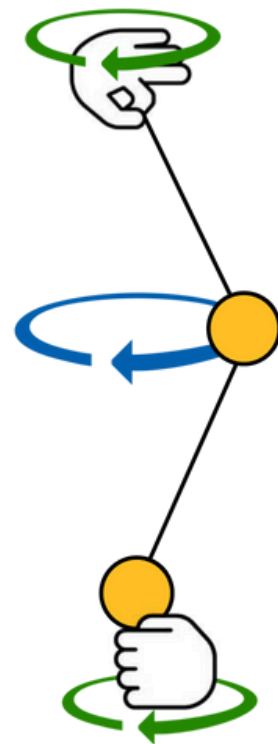
# Items/Configuration



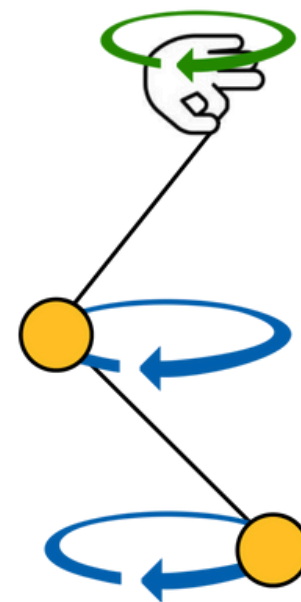
# Experimental method



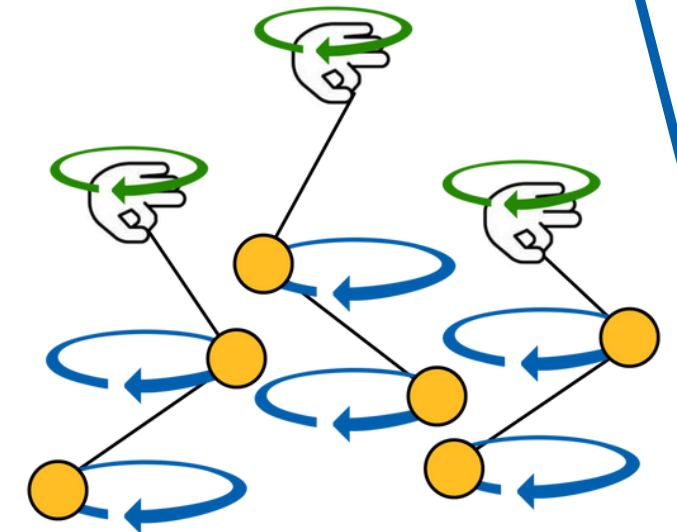
- Hold the middle of the upper string and grab the ball at the bottom.



- Then rotate Two Ball String 3 times.

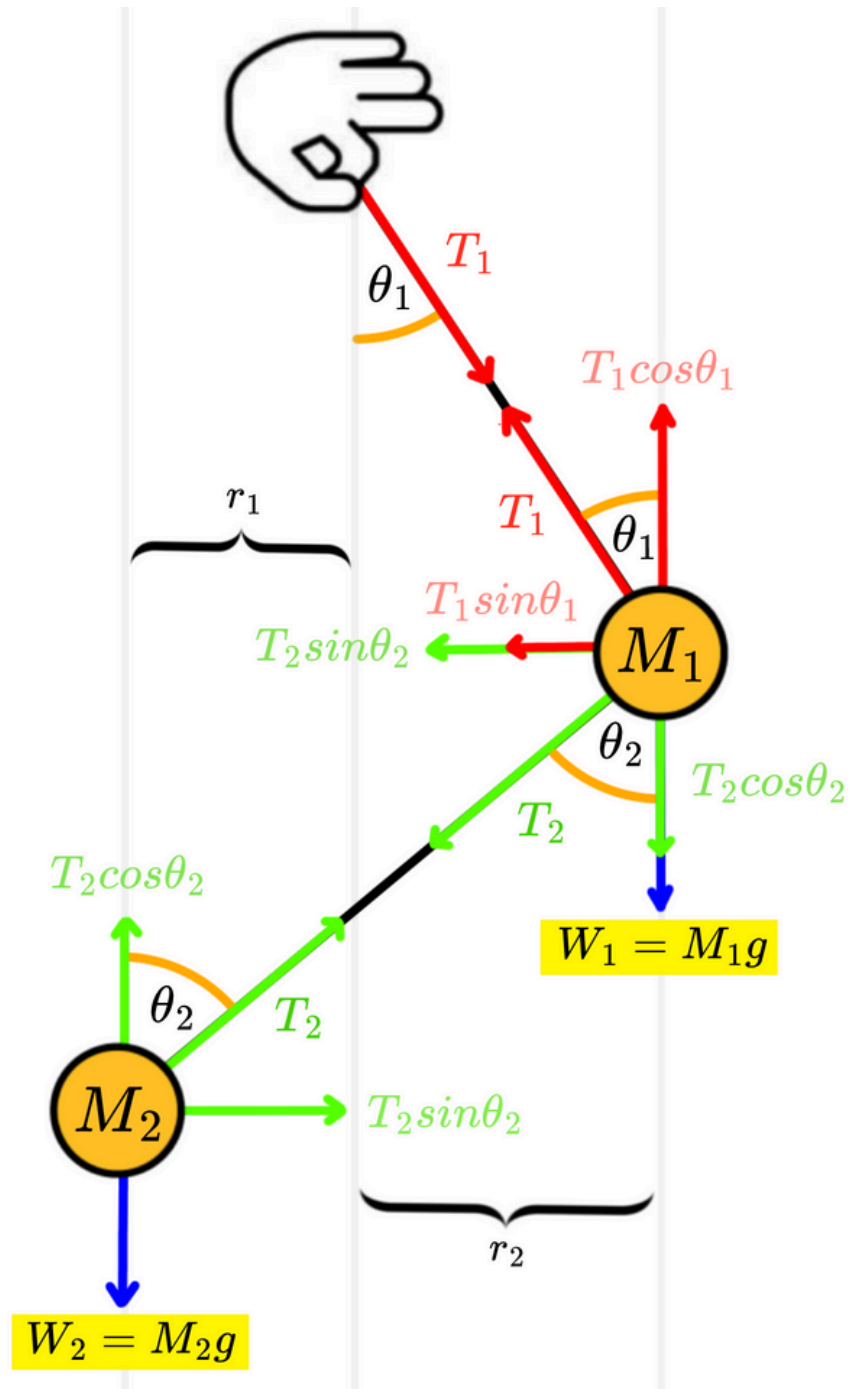


- Release the ball at the bottom and keep rotating Two Ball String for about 30 seconds.



- Try experimet again 3 times.

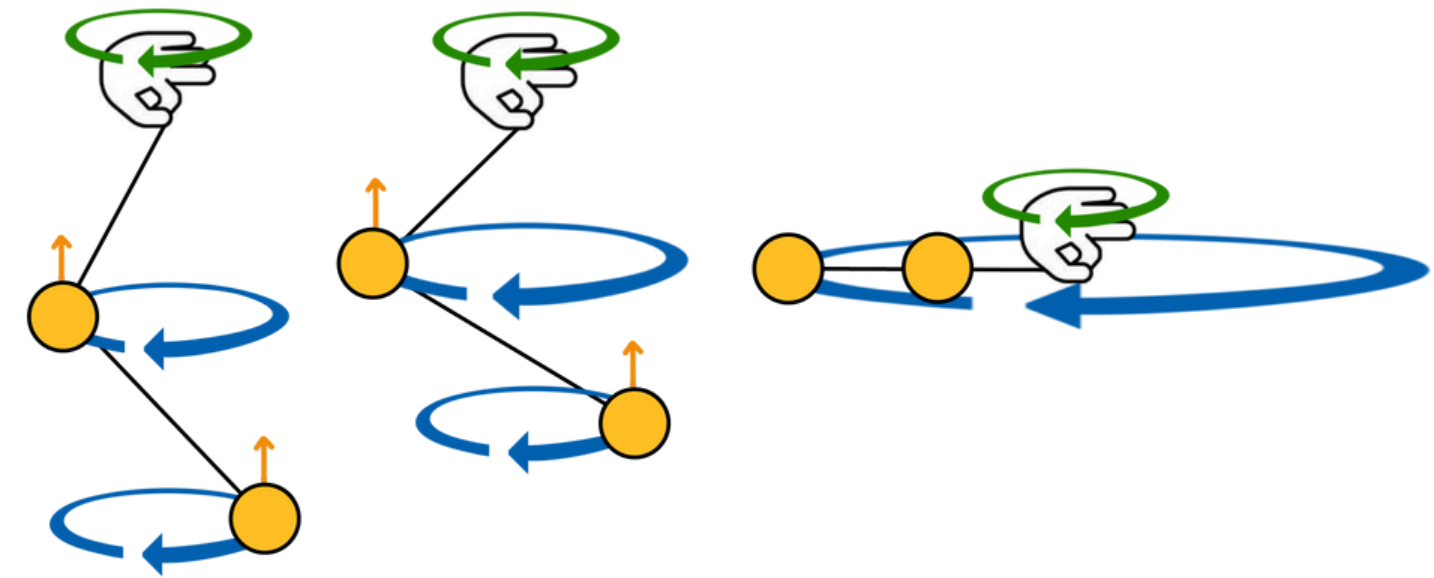
# Hypothesis



## On earth

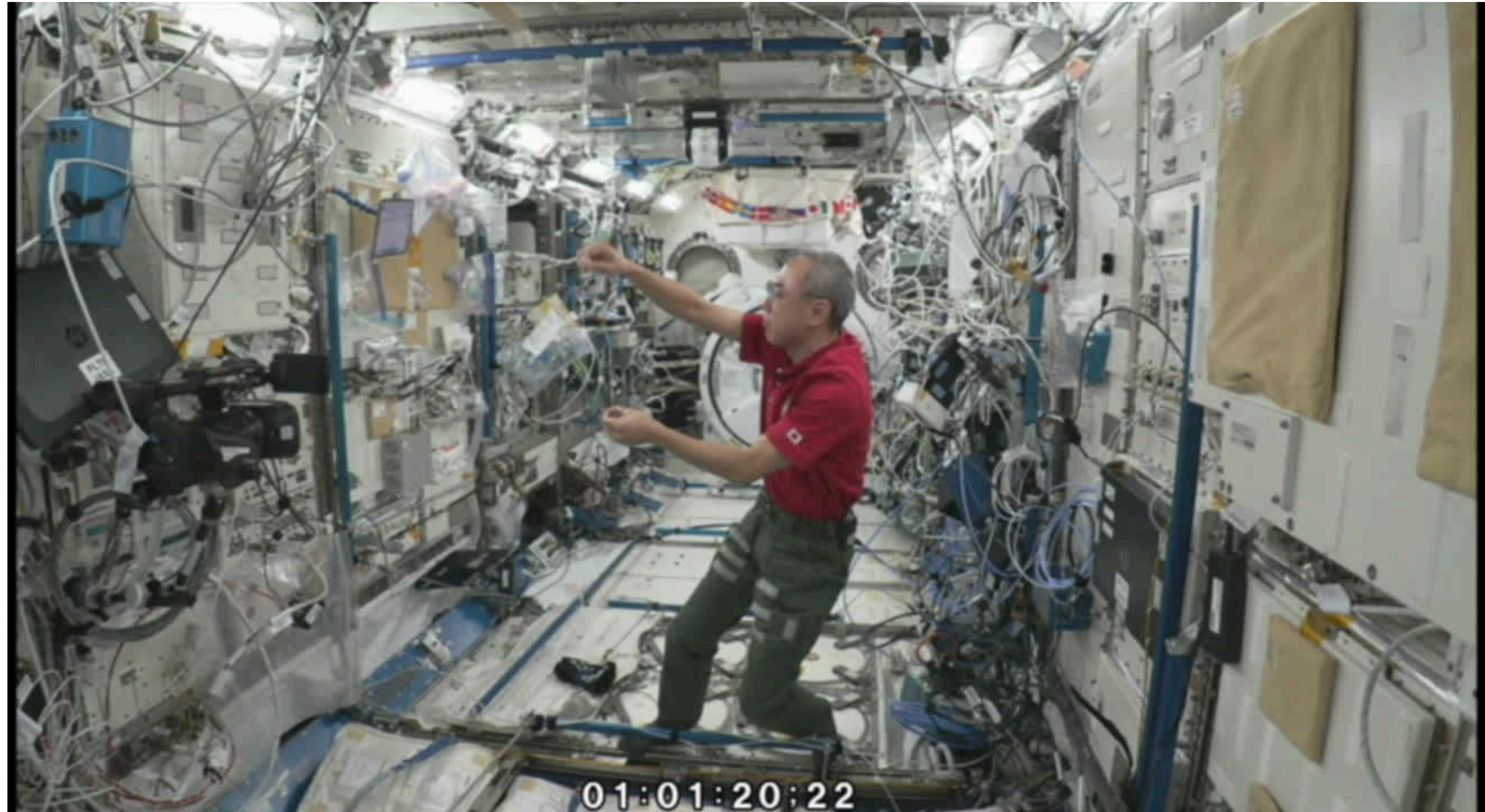
Both balls can continue to rotate on two different plane by equality of weight (mass\*gravity) and rope tension force.

→ (arrow) is a moving direction of balls



## On Space

Both ball will slowly rotating and go upwards until they are in the same plane as rotating hand.

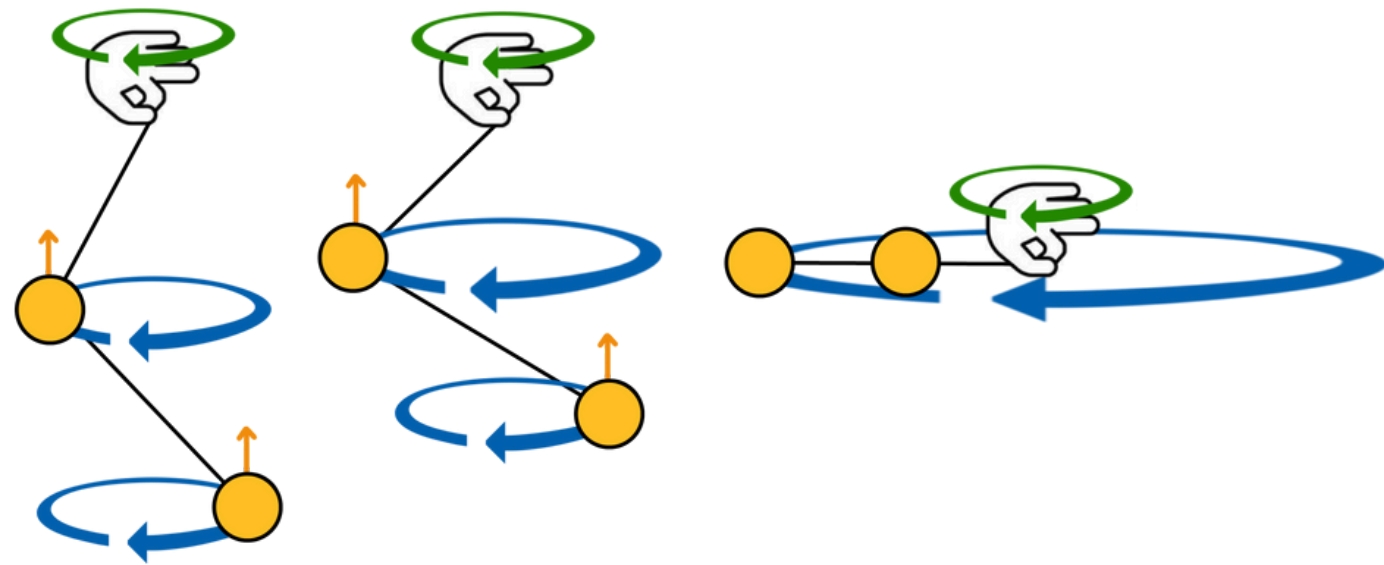


*Video of experiments on the International Space Station*

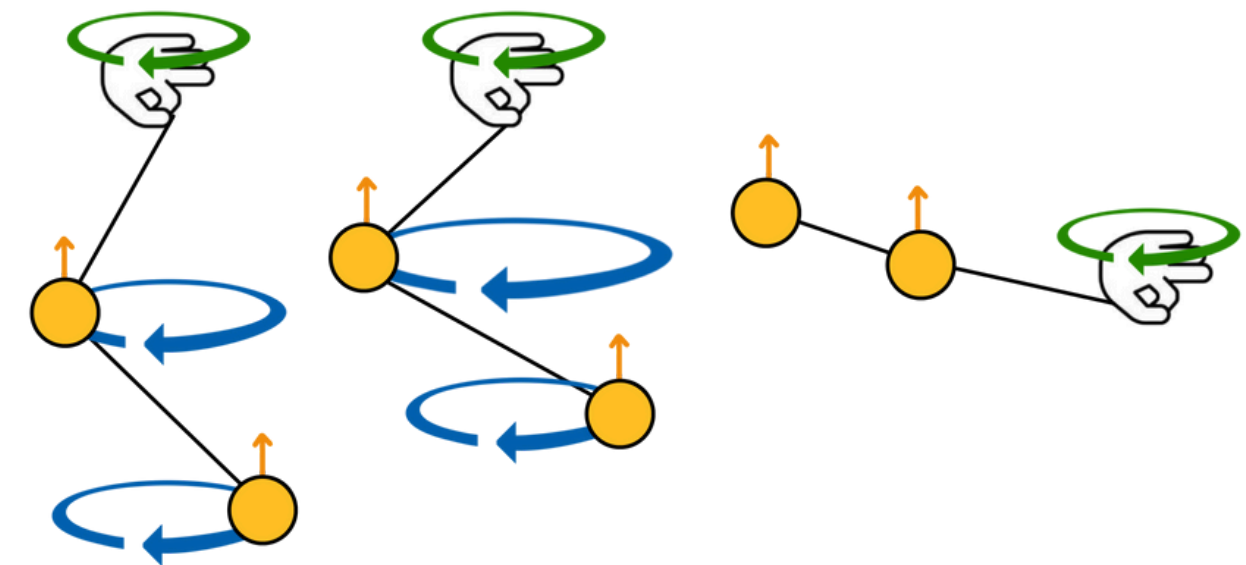
# Experimental result

→ (arrow) is a moving direction of balls

## • Hypothesis



## • Real experiment result



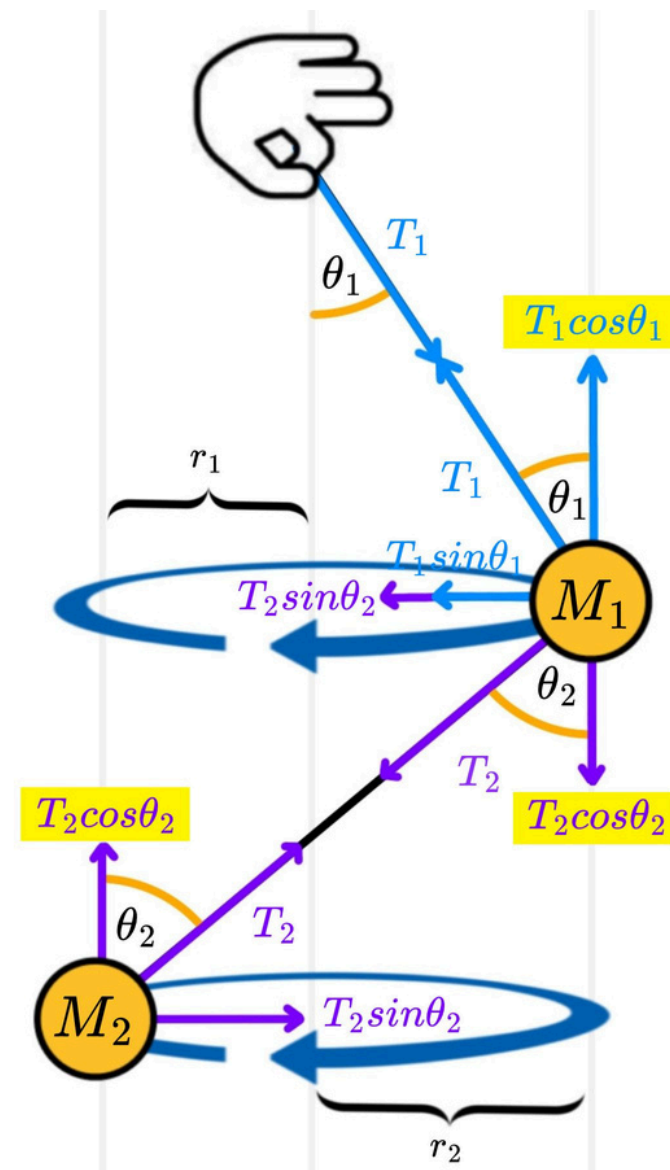
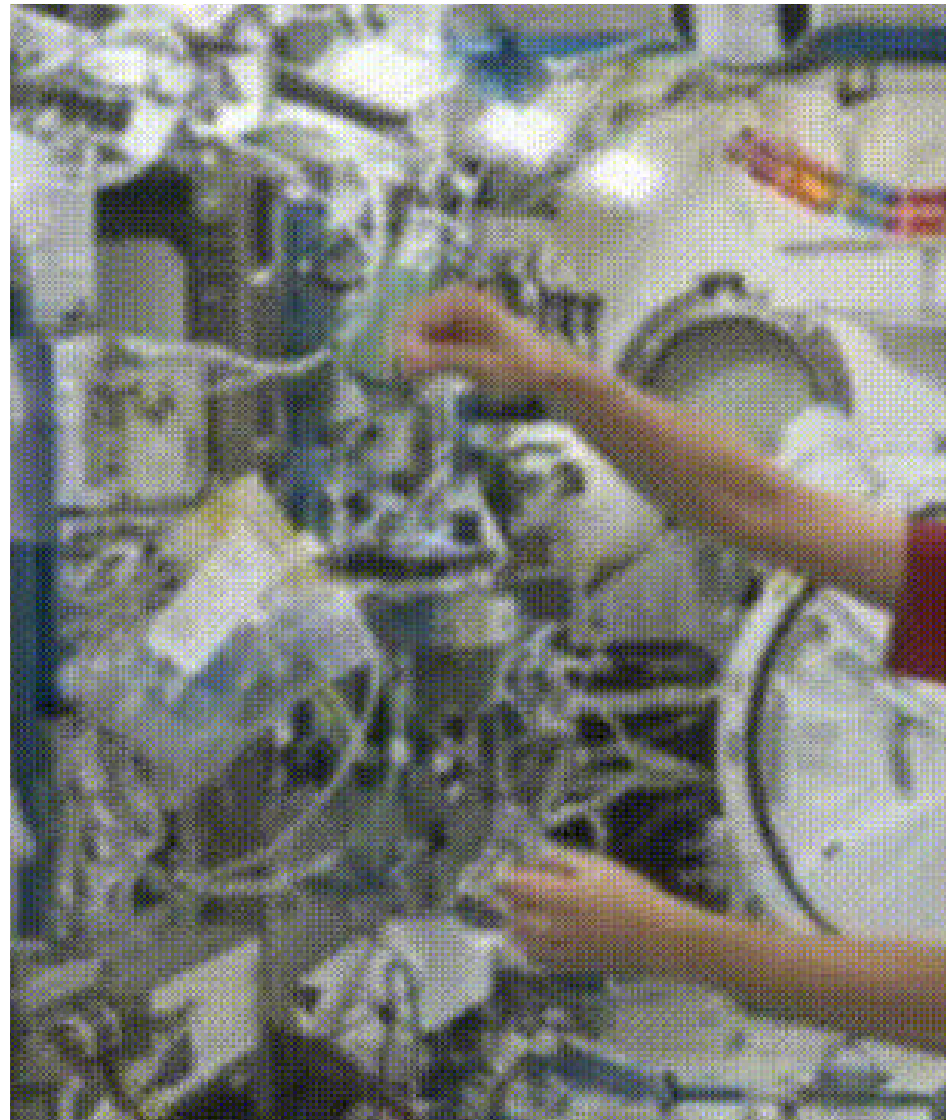
- Real experiment result is similar to our Hypothesis but both balls aren't stop at same plane of the astronaut hand.

- In microgravity both balls are affected only by rope tension force that pull them up in start of the experiment. When pull the hand out of lower ball , both ball will have inertia and continuly to spin up untill full length of the rope that balls was tied.



# Other noticeable things from result of experiment(1)

- lower ball goes upwards faster than middle ball



- The lower ball has only affected by rope tension force that have upward direction only
- The middle ball has affected by two tension force that have a direction up and down

## Other noticeable things from result of experiment(2.1)

- rotation speed of middle ball are affect to upwards speed



From our inspection if rotate middle ball faster. Both balls will go upwards faster too.

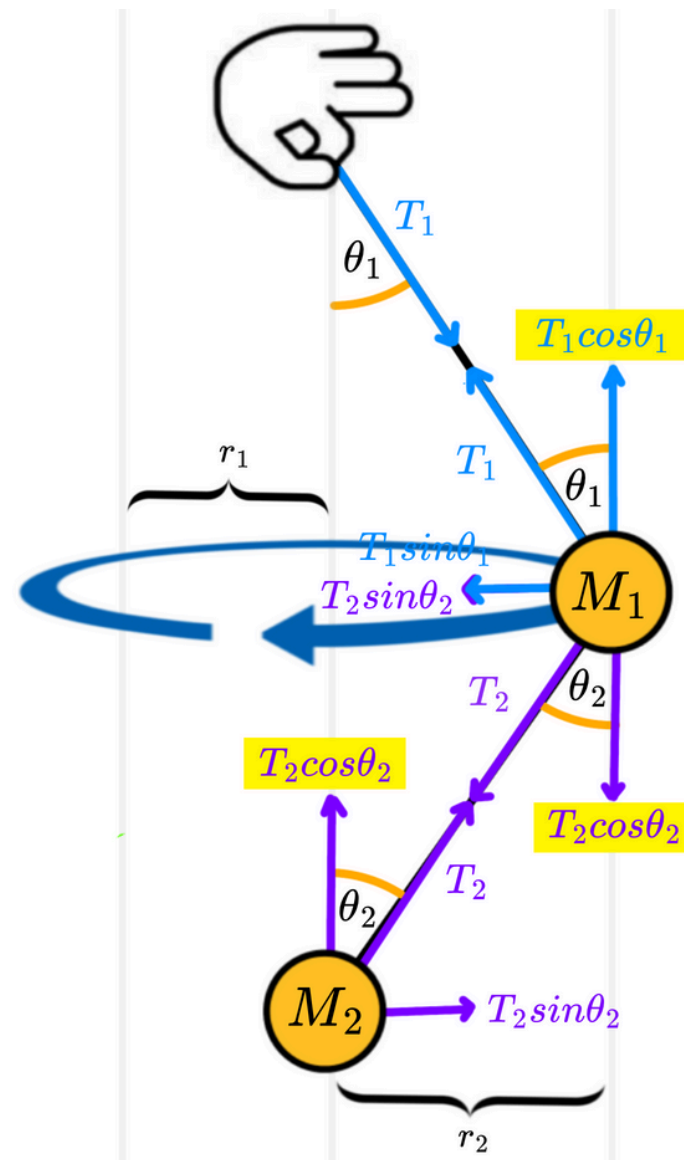


# Other noticeable things from result of experiment(2.2)

- rotation speed of middle ball are affect to upwards speed

Consider at Instantaneous moment when put hand out of lower ball

(We got that  $\theta_1, \theta_2, r_1, M$  is constant)



X axis of middle ball

$$T_1 \sin \theta_1 + T_2 \sin \theta_2 = M_1 (\omega)^2 r \quad \text{----->} \quad T_1, T_2 \propto \omega^2$$

Y axis of middle ball

$$F_{upward} = T_1 \cos \theta_1 - T_2 \cos \theta_2$$

Middle

Y axis of lower ball

$$F_{upward} = T_2 \cos \theta_2$$

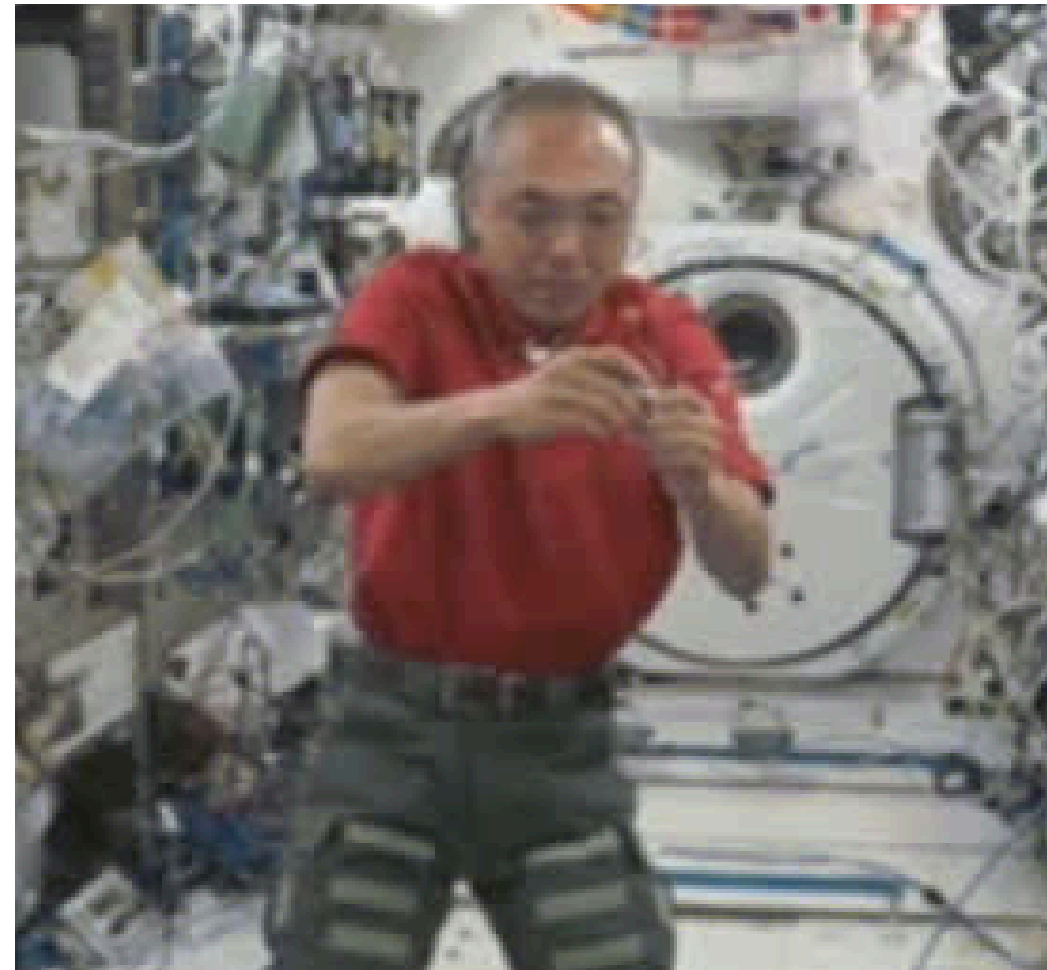
Lower

$$F_{upward} \propto T_1, T_2 \propto \omega^2$$

$T$  - Rope Tension force     $\omega$  - Angular speed of the middle ball

## Other noticable things from result of experiment(3)

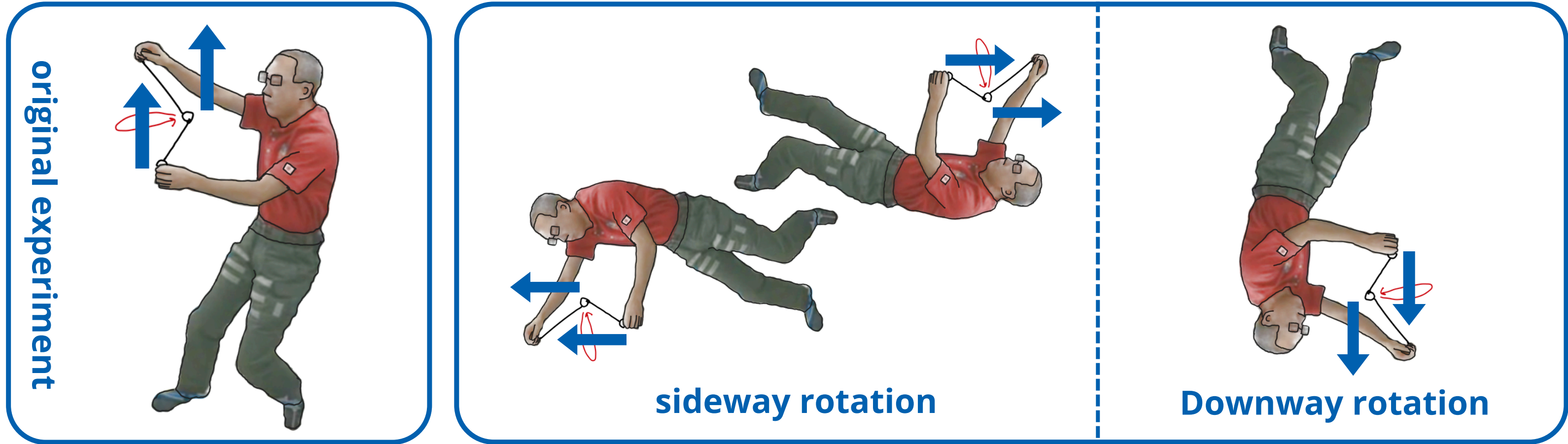
- The balls seem to be always going up even not in the experiment session



- we think its beacuse forces from astronaut hand when he draging the string combine with rope tension force

# Some interesting idea

➔ balls movement direction



- Our experiment can add a little furthermore part by trying to do the same experiment **but in different direction.**
- We think the result is the same as original experiment but balls are going to spin up in the direction of the head of astronaut .

# Q&A session

Thank you for watching

Thanks for our Menter teachers

**Mrs.Lalana Laycharoen - Teacher Lalana**

**Mrs.Sayyai Chaiwann - Teacher Sayyai**

**Mr.Kullawan Intaoud - Teacher Tew**

**Mrs.Yonlada Boonchai - Teacher Beer**