



# Low-Energy High-Precision Experiments Standard Model

Kanishk<sup>1</sup> Kirana. K.K<sup>2</sup>

<sup>1</sup>Undergraduate  
Indian Institute of Science

<sup>2</sup>Ph.D.  
Indian Institute of Science

7 April, 2025

# Table of Contents

Non-Newtonian Gravitational Interactions

Neutron Lifetime Measurement

# Table of Contents

Non-Newtonian Gravitational Interactions

Neutron Lifetime Measurement

# Non-Newtonian Gravitational Interactions

- ▶ Newton's law of gravity (at large scale)

# Non-Newtonian Gravitational Interactions

- Newton's law of gravity (at large scale)

$$F = G \frac{m_1 m_2}{r^2}$$

$$V = -G \frac{m_1 m_2}{r}$$

where  $G = 6.6743 \cdot 10^{-11} \text{m}^3/\text{kg} \cdot \text{s}^2$

# Non-Newtonian Gravitational Interactions

- ▶ Newton's law of gravity (at large scale)

$$F = G \frac{m_1 m_2}{r^2}$$

$$V = -G \frac{m_1 m_2}{r}$$

where  $G = 6.6743 \cdot 10^{-11} \text{m}^3/\text{kg} \cdot \text{s}^2$

- ▶ Yukawa-like modified potential (at small scale)

# Non-Newtonian Gravitational Interactions

- ▶ Newton's law of gravity (at large scale)

$$F = G \frac{m_1 m_2}{r^2}$$

$$V = -G \frac{m_1 m_2}{r}$$

where  $G = 6.6743 \cdot 10^{-11} \text{m}^3/\text{kg} \cdot \text{s}^2$

- ▶ Yukawa-like modified potential (at small scale)

$$V = -G \frac{m_1 m_2}{r} (1 + \alpha \cdot e^{-r/\lambda})$$

where,  $\alpha$  = Strength Factor

$\lambda$  = Yukawa distance

# Non-Newtonian Gravitational Interactions

- ▶ To learn more about  $\alpha$  and  $\lambda$  we need to probe the small distance gravitational interaction of particles.



# Non-Newtonian Gravitational Interactions

- ▶ To learn more about  $\alpha$  and  $\lambda$  we need to probe the small distance gravitational interaction of particles.

# Non-Newtonian Gravitational Interactions



# Non-Newtonian Gravitational Interactions



- The Institut Laue Langevin (ILL), Grenoble, France

In this slide

In this slide  
the text will be partially visible

In this slide  
the text will be partially visible  
And finally everything will be there

# Table of Contents

Non-Newtonian Gravitational Interactions

Neutron Lifetime Measurement

# Sample frame title

In this slide, some important text will be highlighted because it's important. Please, don't abuse it.

## Remark

### Sample text

## Important theorem

Sample text in red box

## Examples

**Here's a super important example.**



## Two-column slide

This is a text in first column.

$$E = mc^2$$

- ▶ First item
- ▶ Second item

This text will be in the second column and on a second thought this is a nice looking layout in some cases.