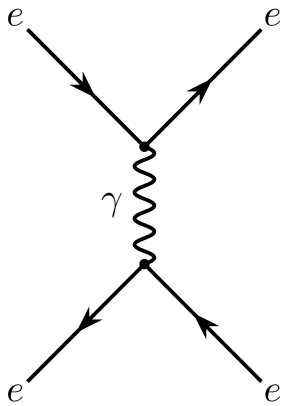
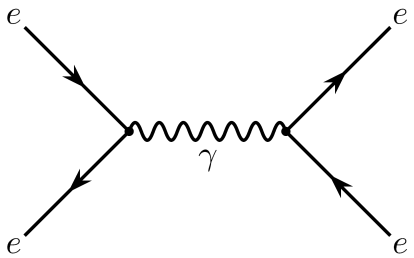
Institute for Theoretical Particle Physics and Cosmology
RWTH AACHEN UNIVERSITY





FeynGame

Feynman Diagrams for Everyone

Robert Harlander, Sven Yannick Klein, and •Magnus Schaaf

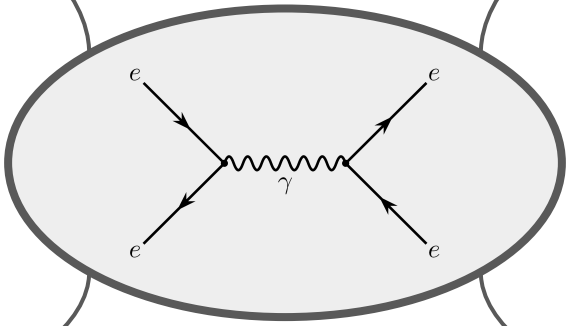
DPG-Frühjahrstagung 2024 – Karlsruhe

06.03.2024

Feynman Diagrams

Graphical representation of mathematical expression

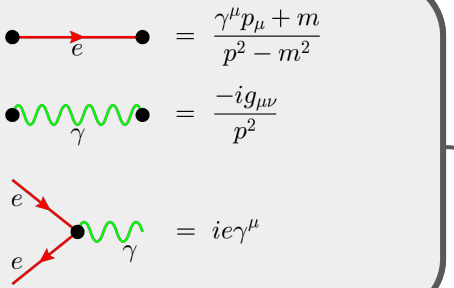
Common language between experimentalists and theorists

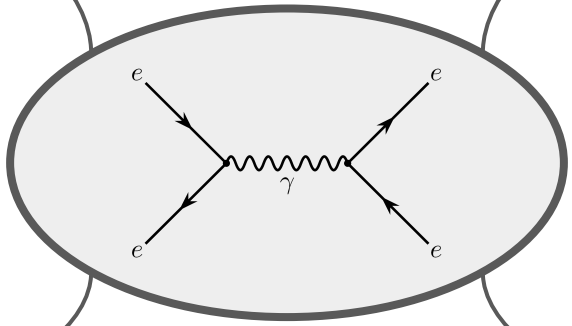


Visualisation of particle interactions

Accessible to the general public

Feynman Diagrams





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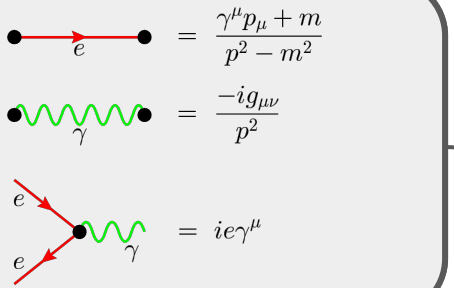
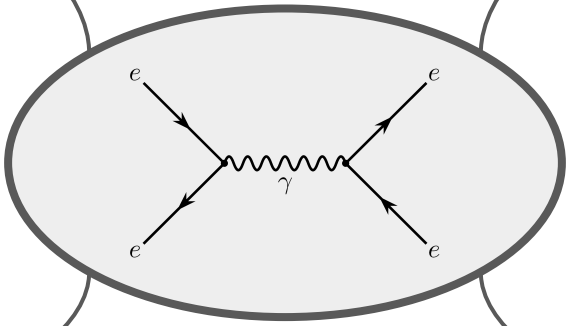
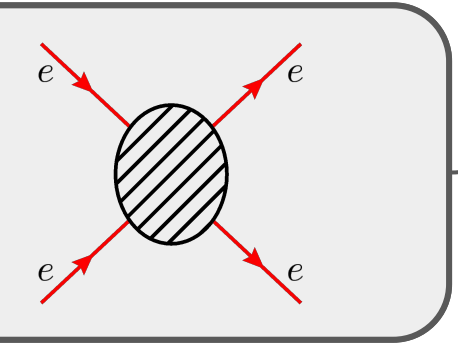
Feynman Diagrams







Common language between experimentalists and theorists

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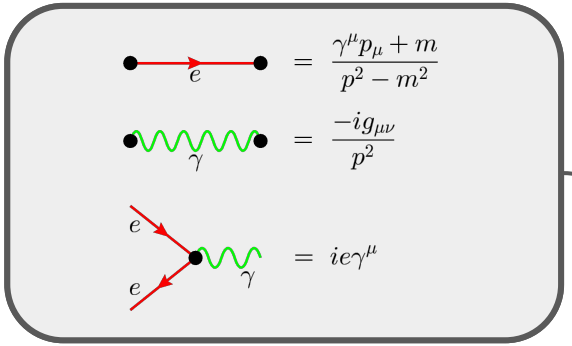
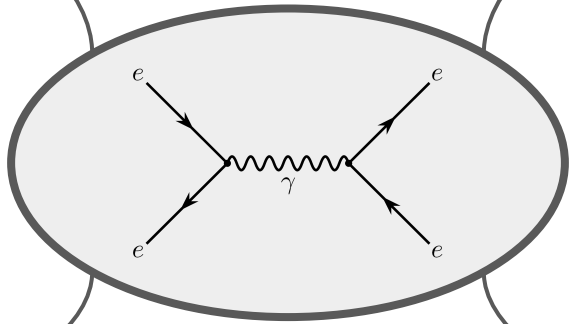
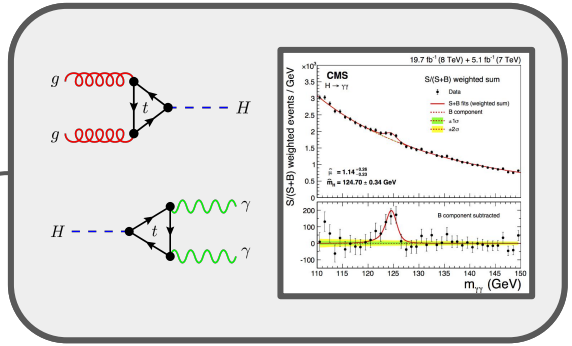
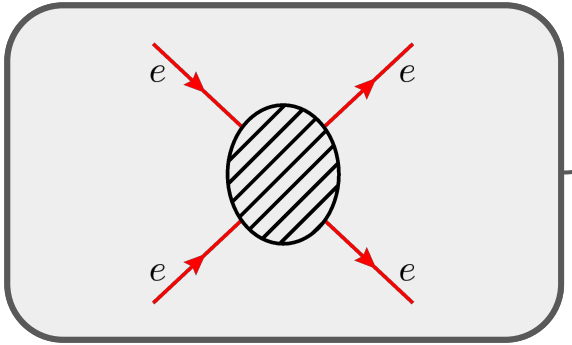
Feynman Diagrams









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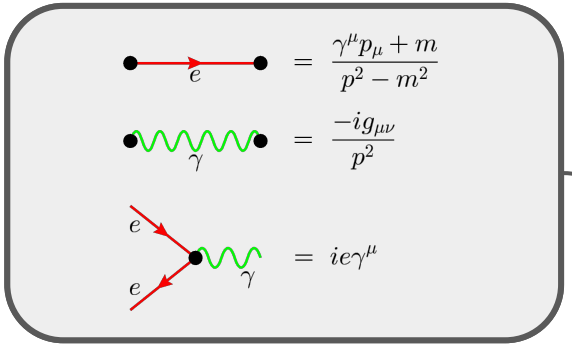
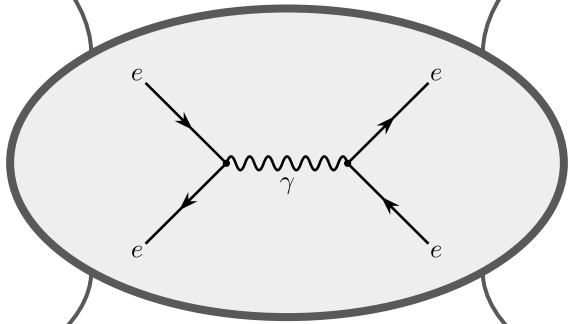
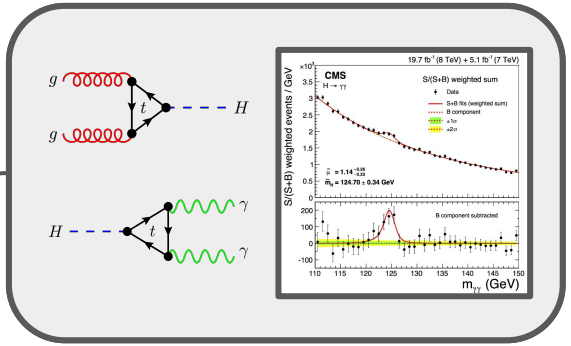
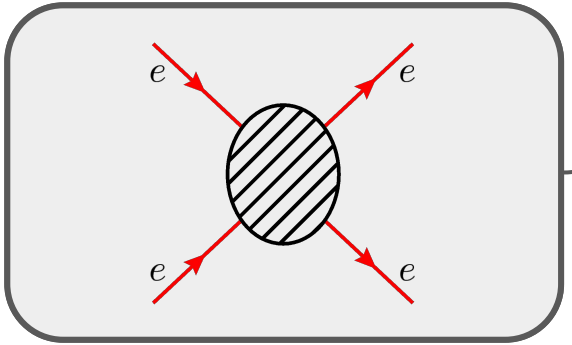
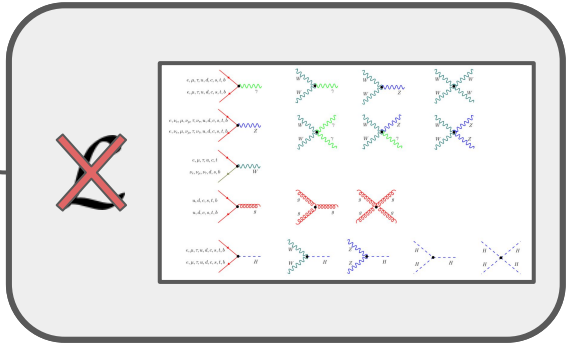
Feynman Diagrams

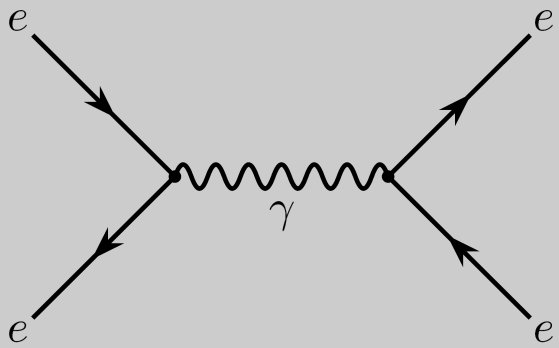


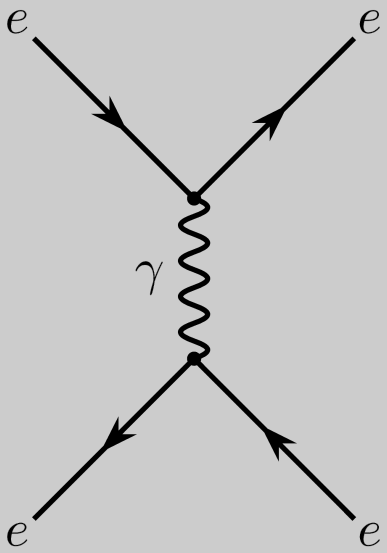








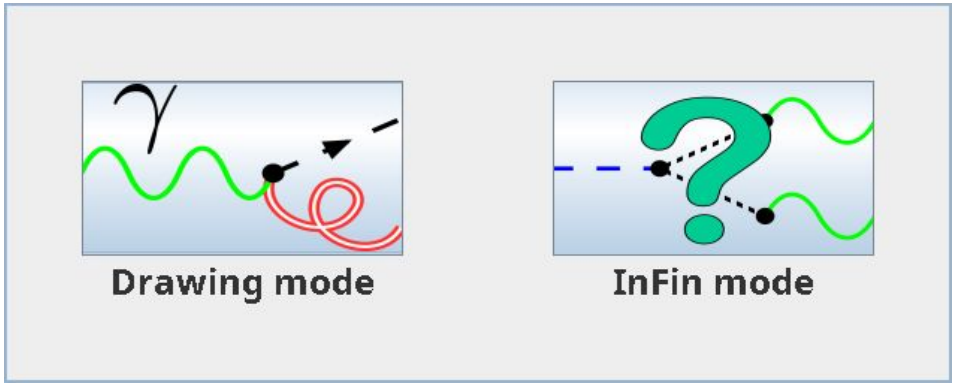




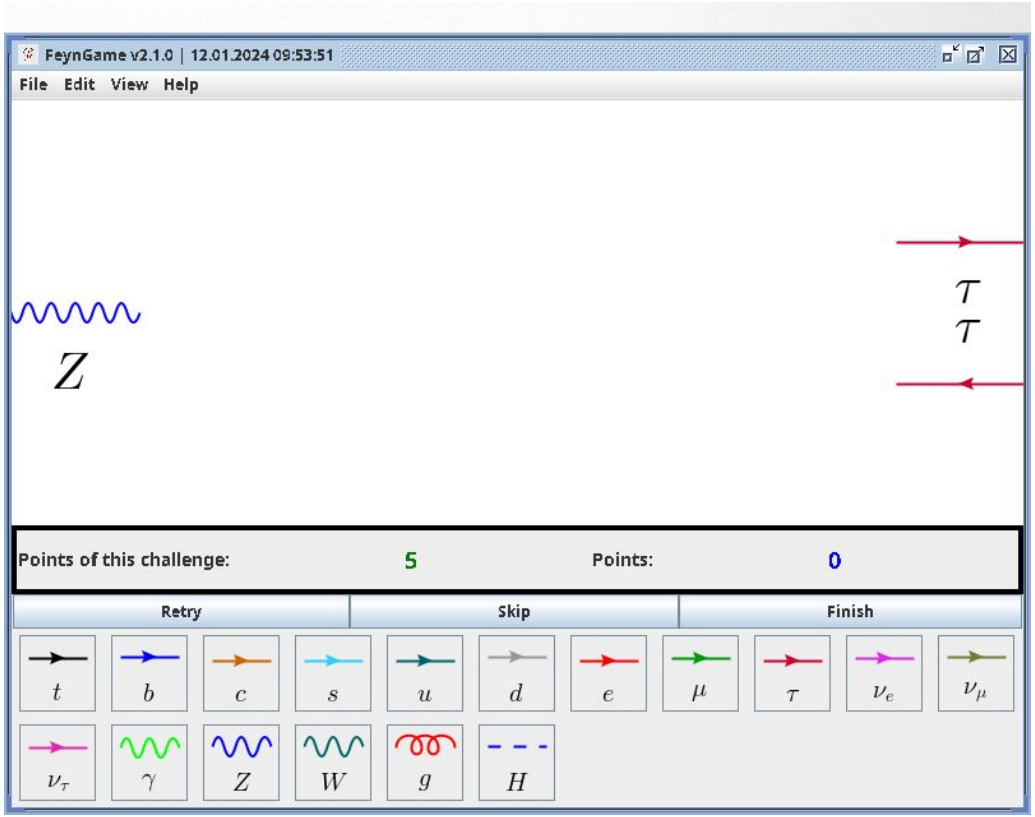
Feynman Diagrams for Everyone

How to make Feynman diagrams accessible for **everyone**?

Introducing: **FeynGame**



Acquiring Feynman Diagrams in a Playful Way



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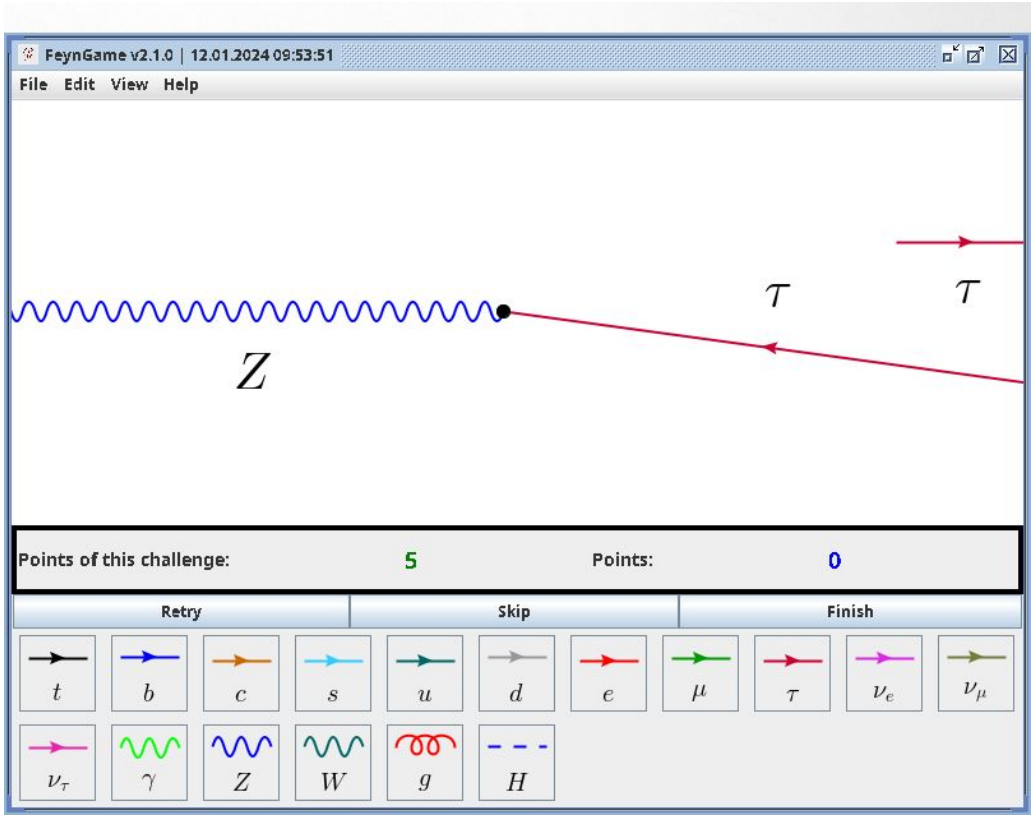
InFin mode



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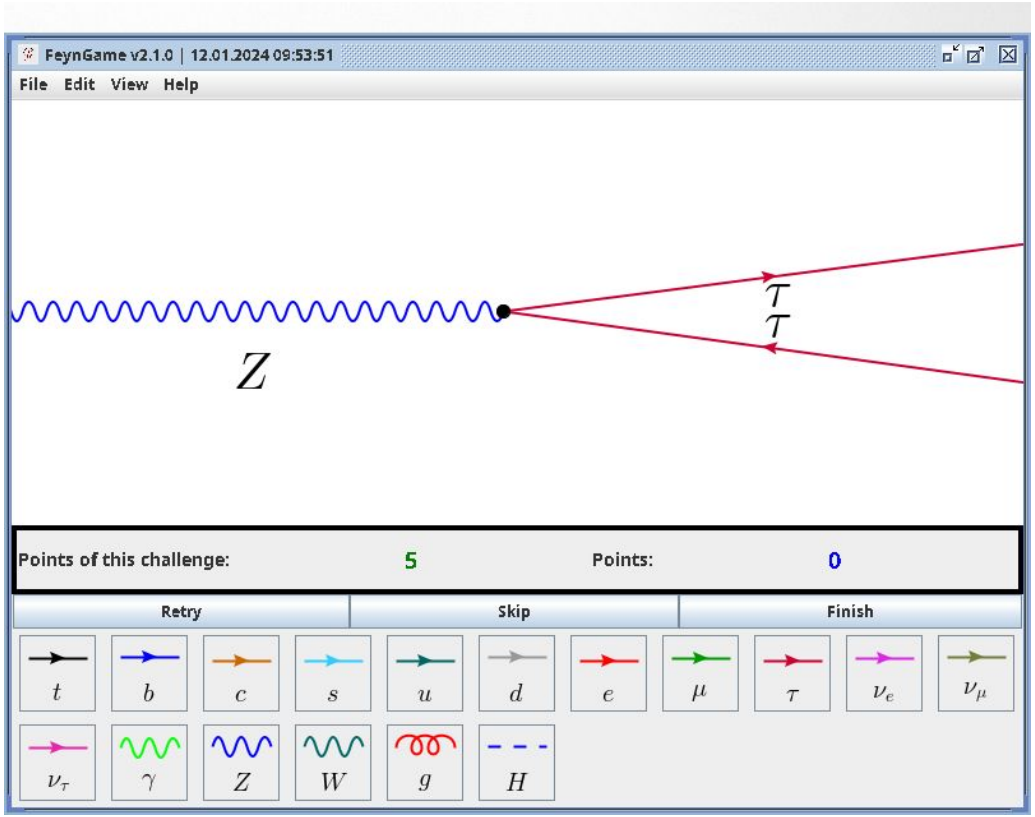

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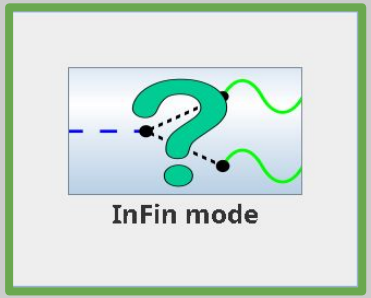

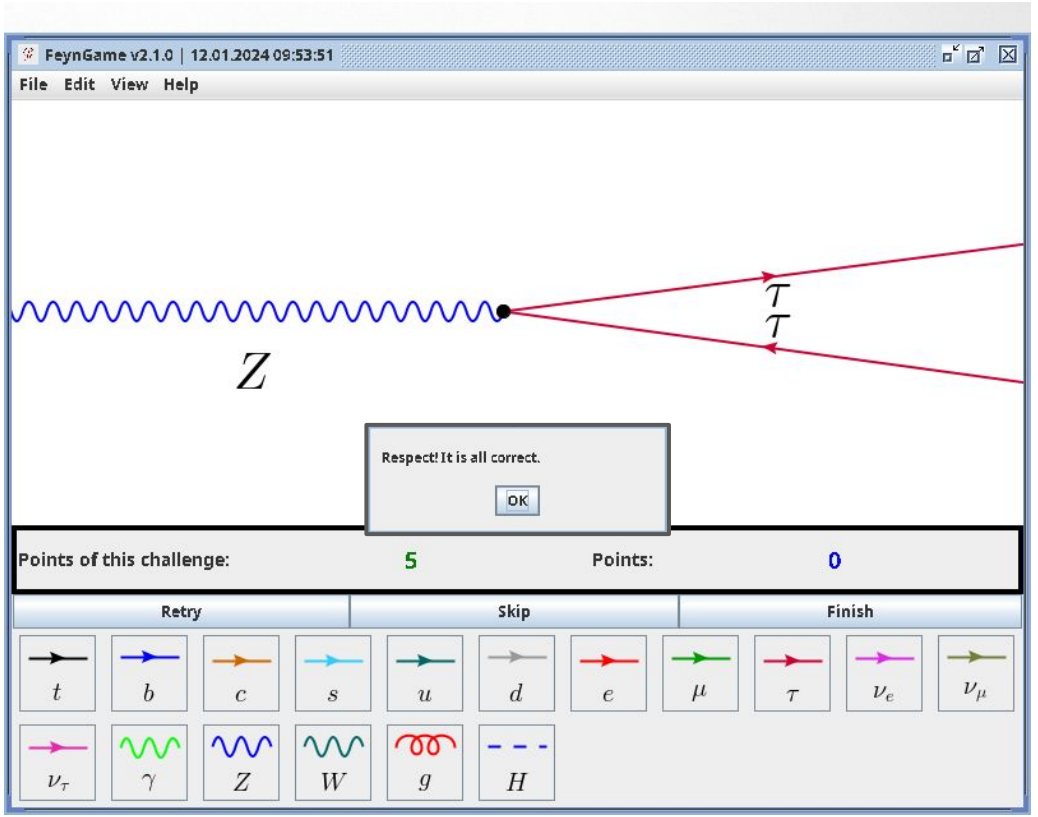

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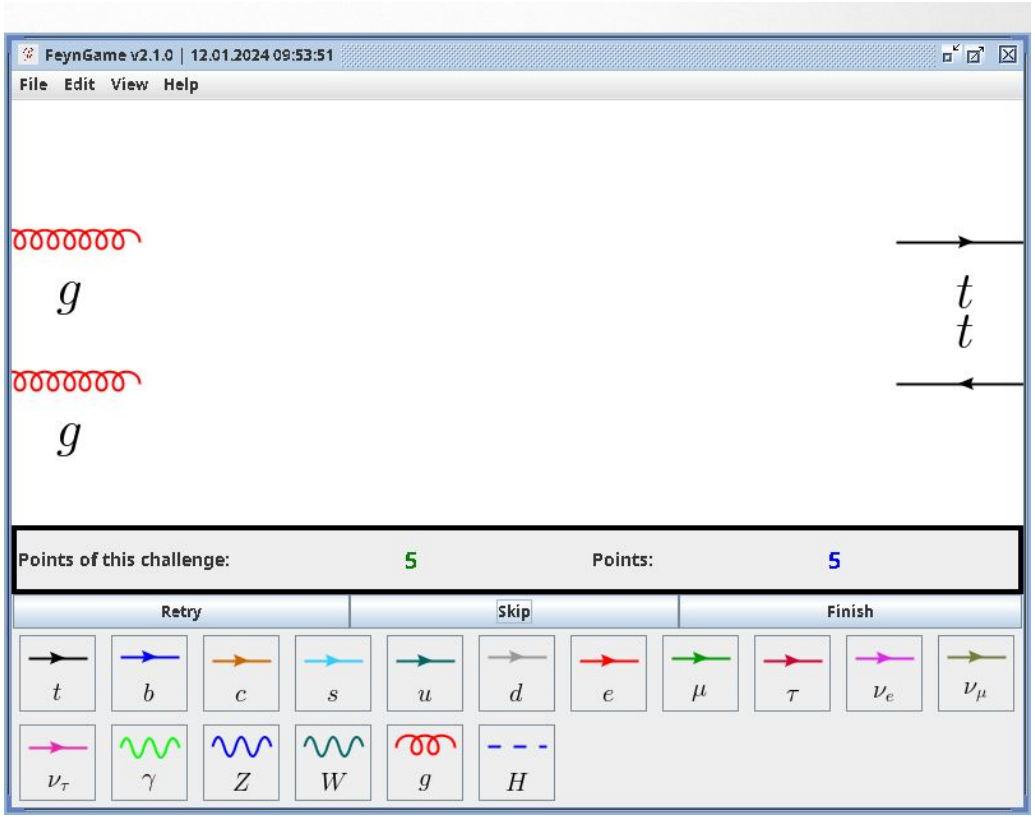

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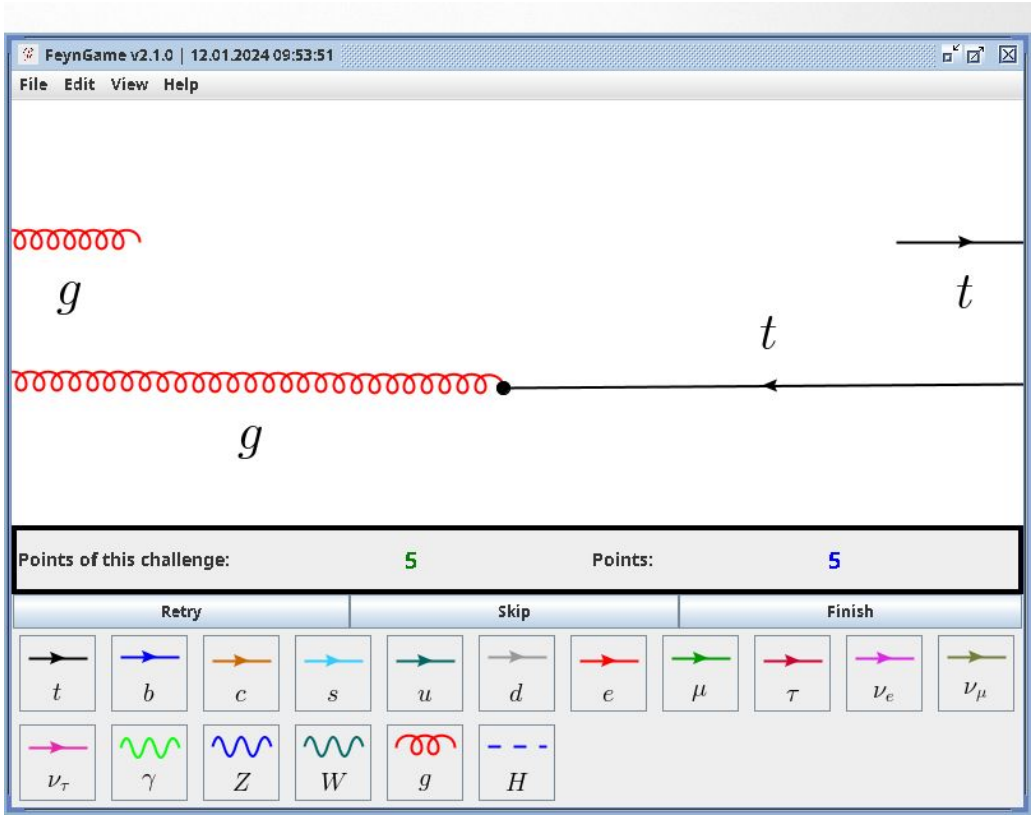

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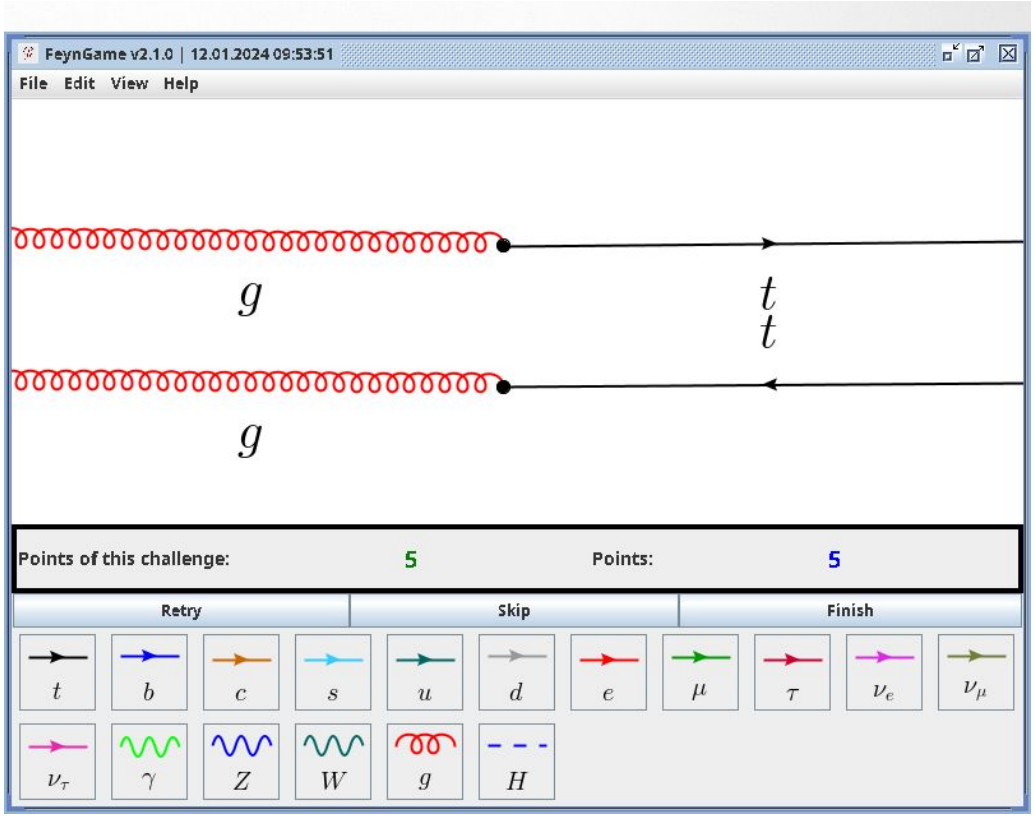

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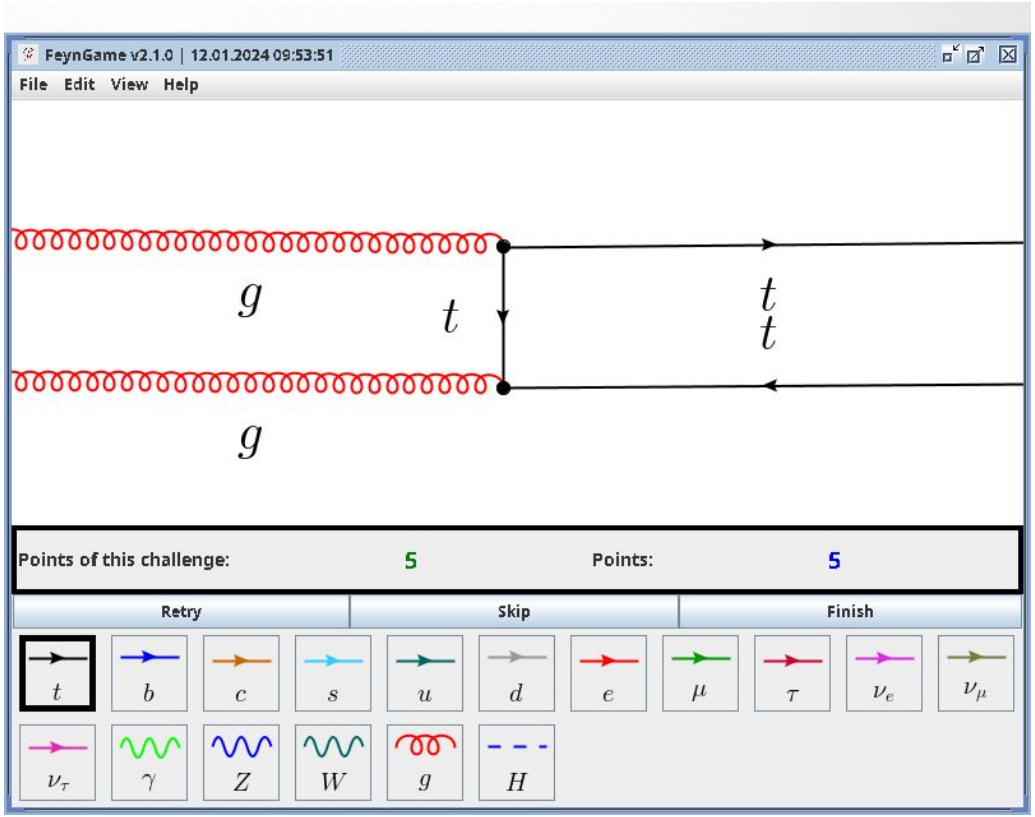

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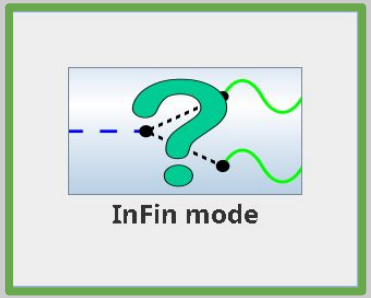

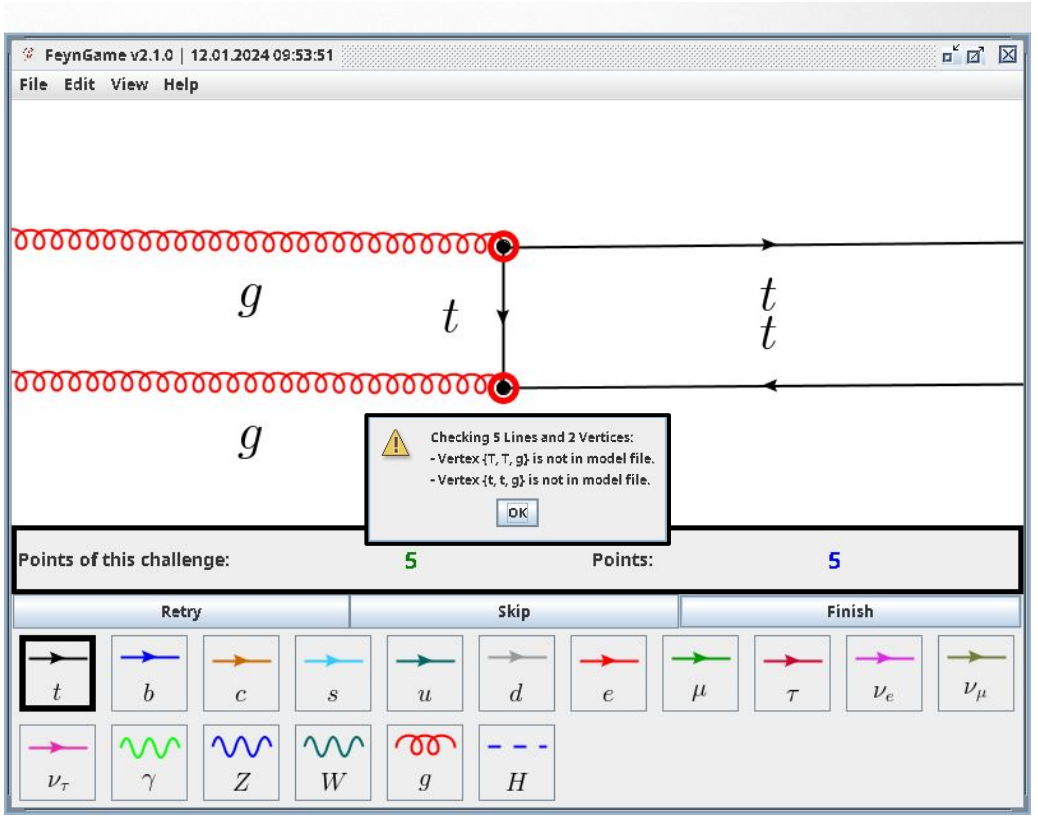

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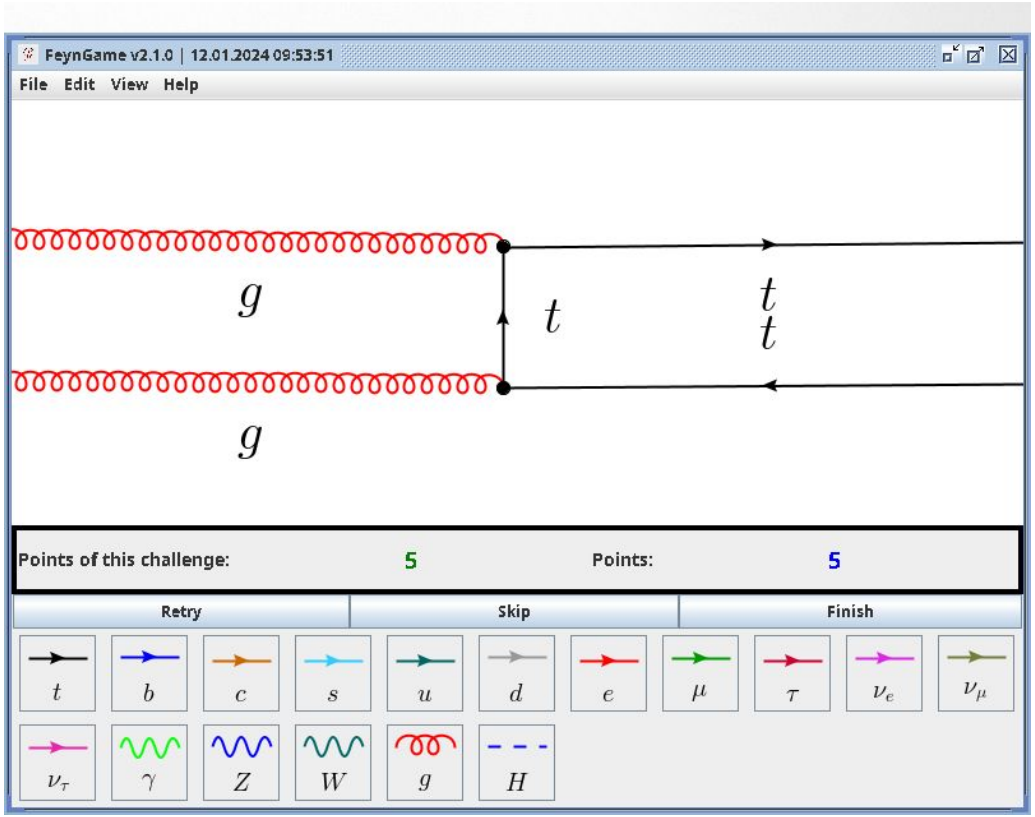

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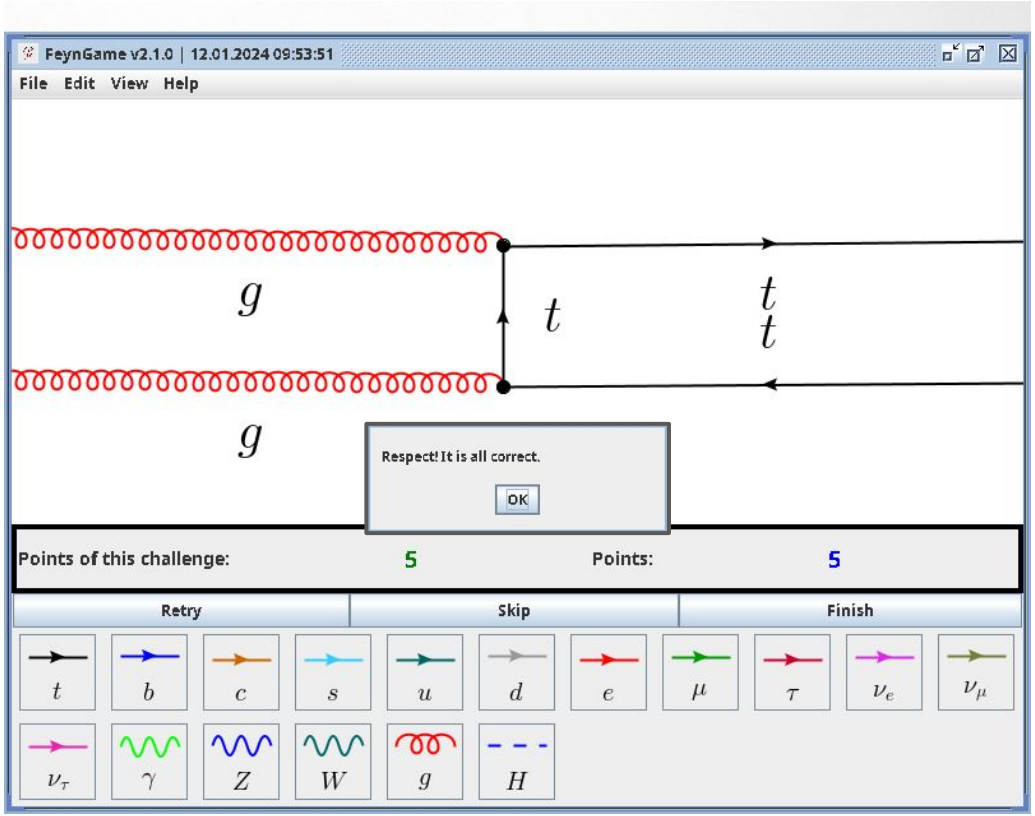
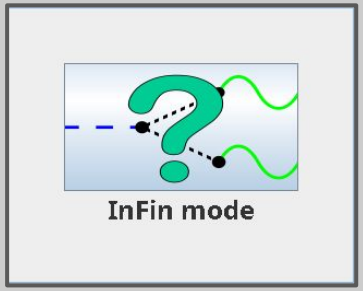
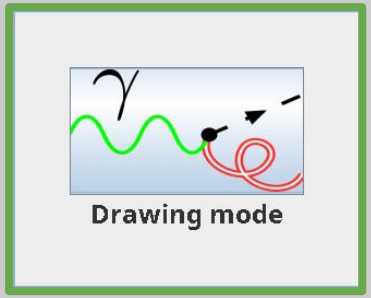
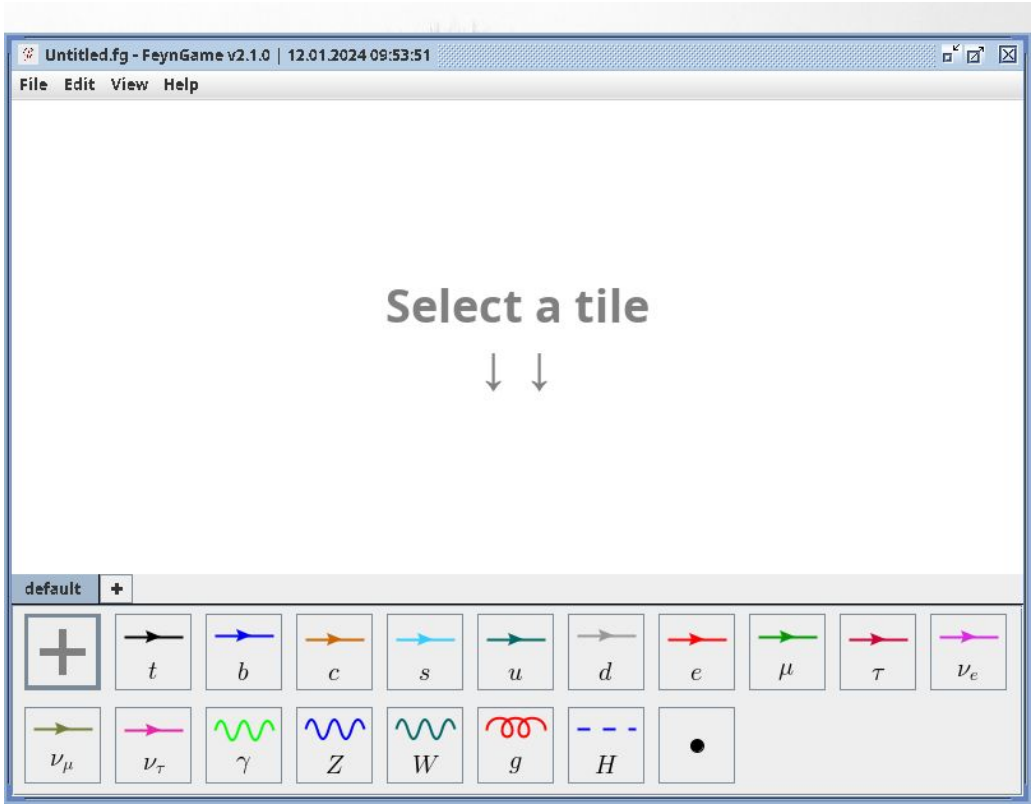


Drawing Feynman Diagrams







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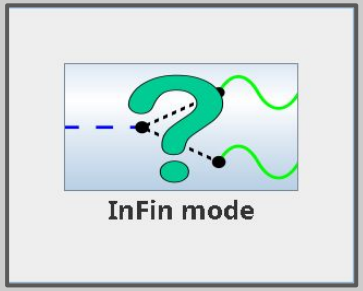

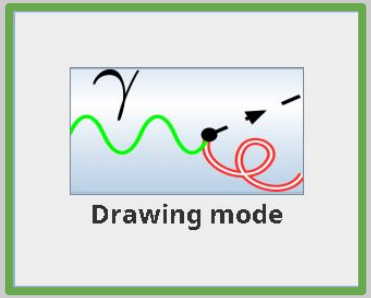

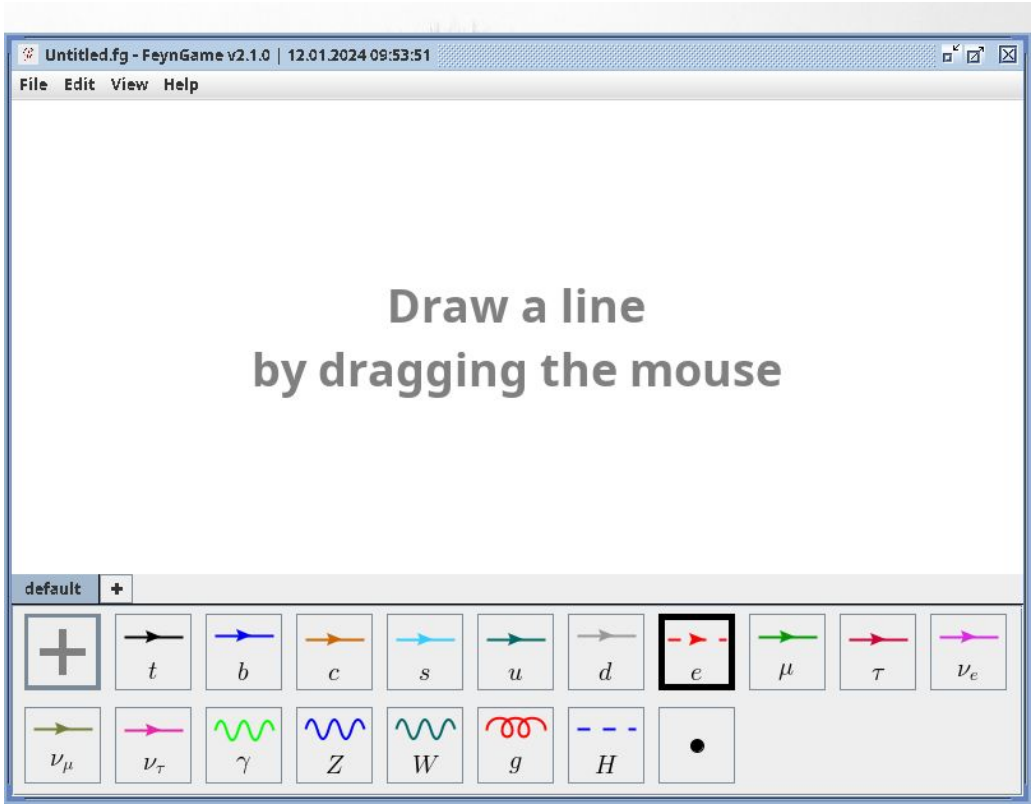

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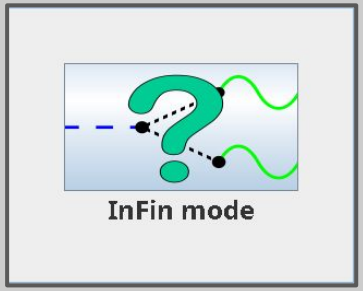

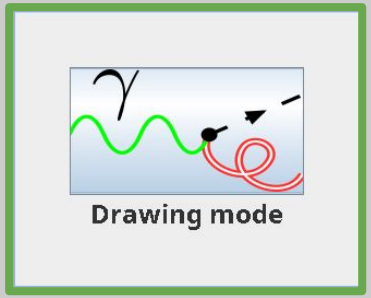

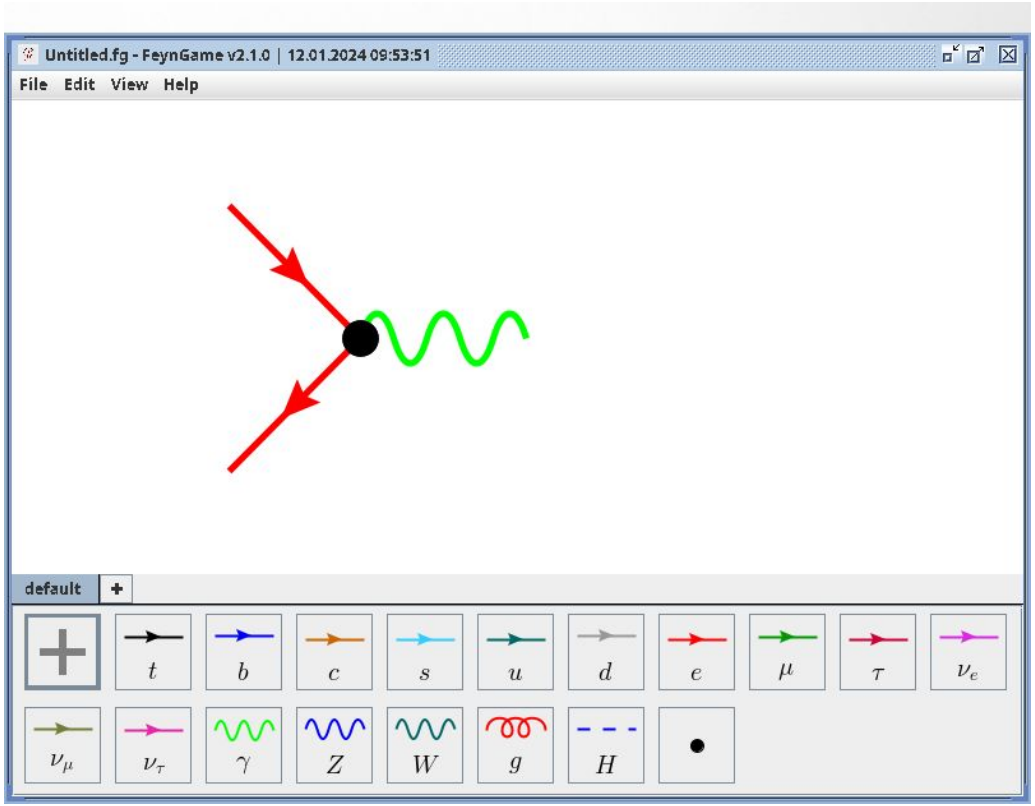

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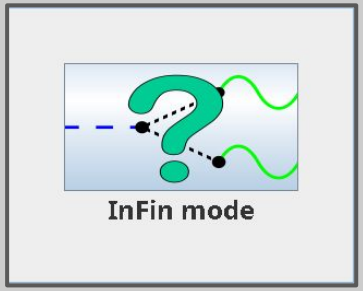

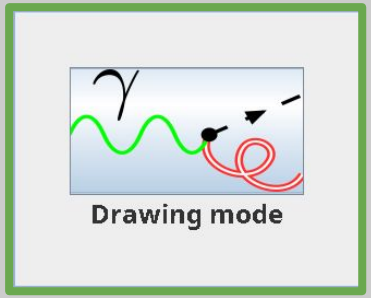

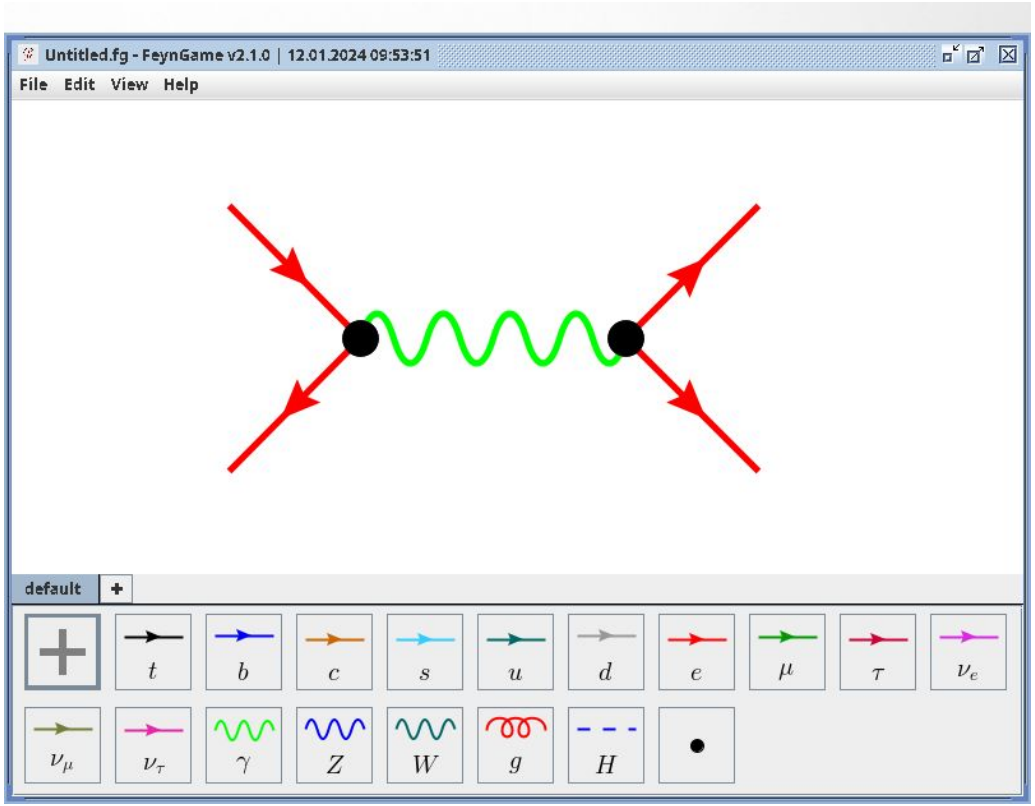

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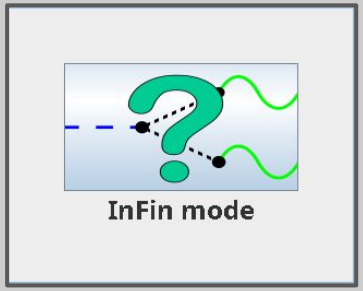
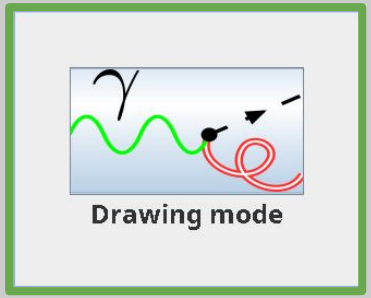
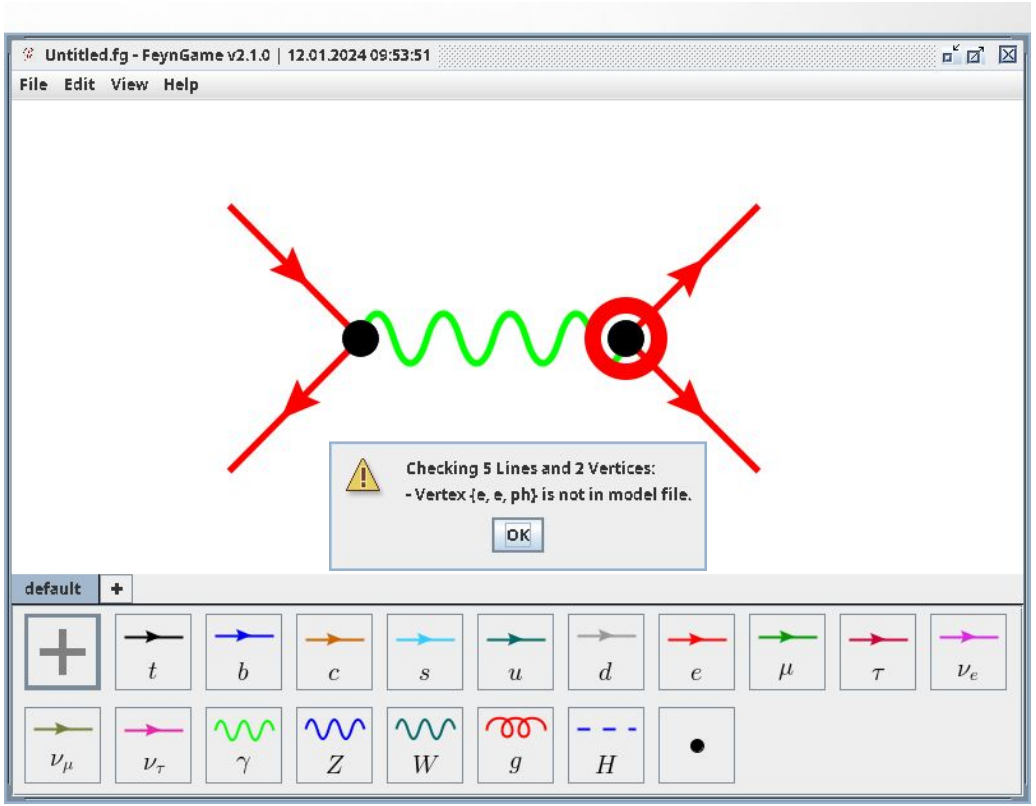
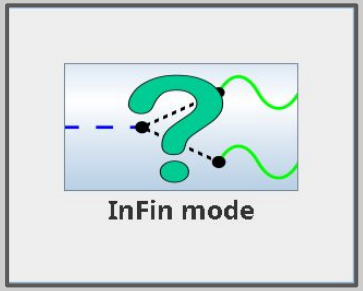
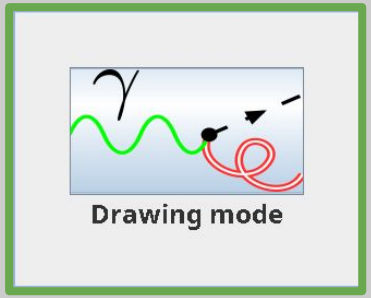


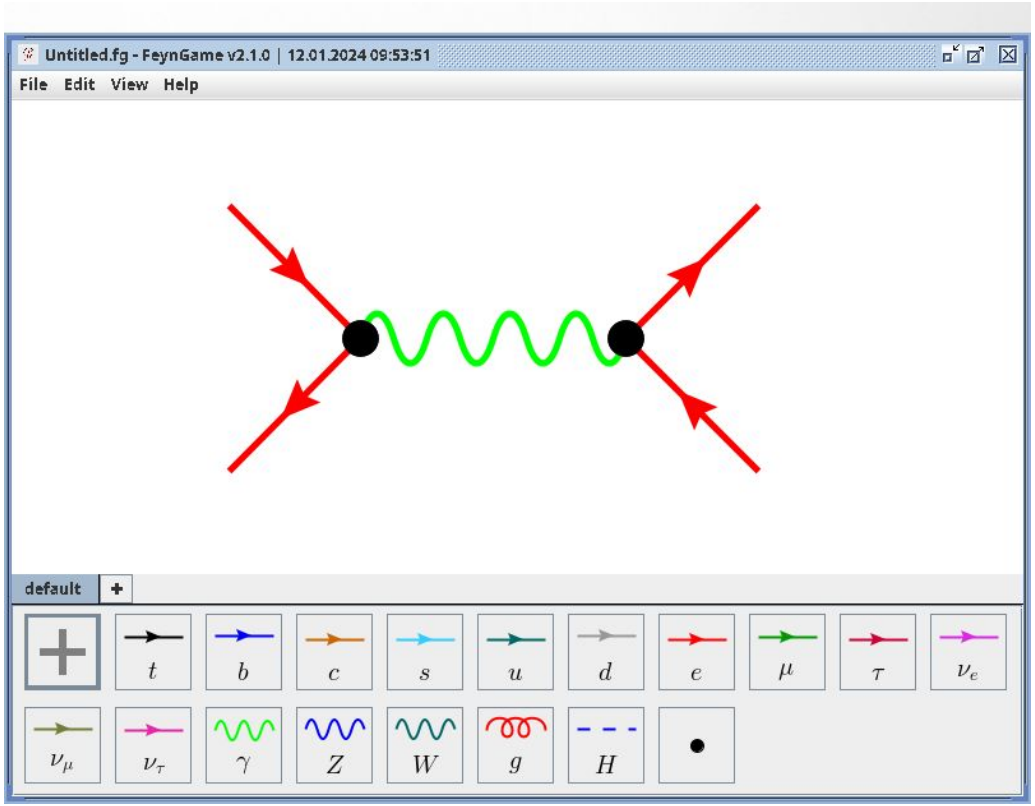




Drawing Feynman Diagrams







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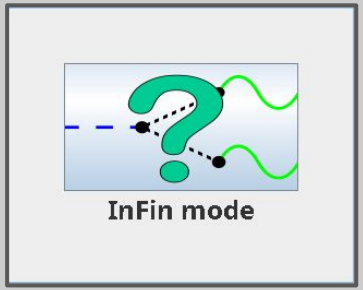
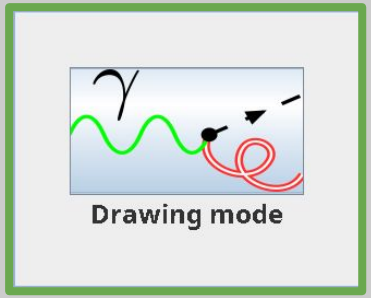
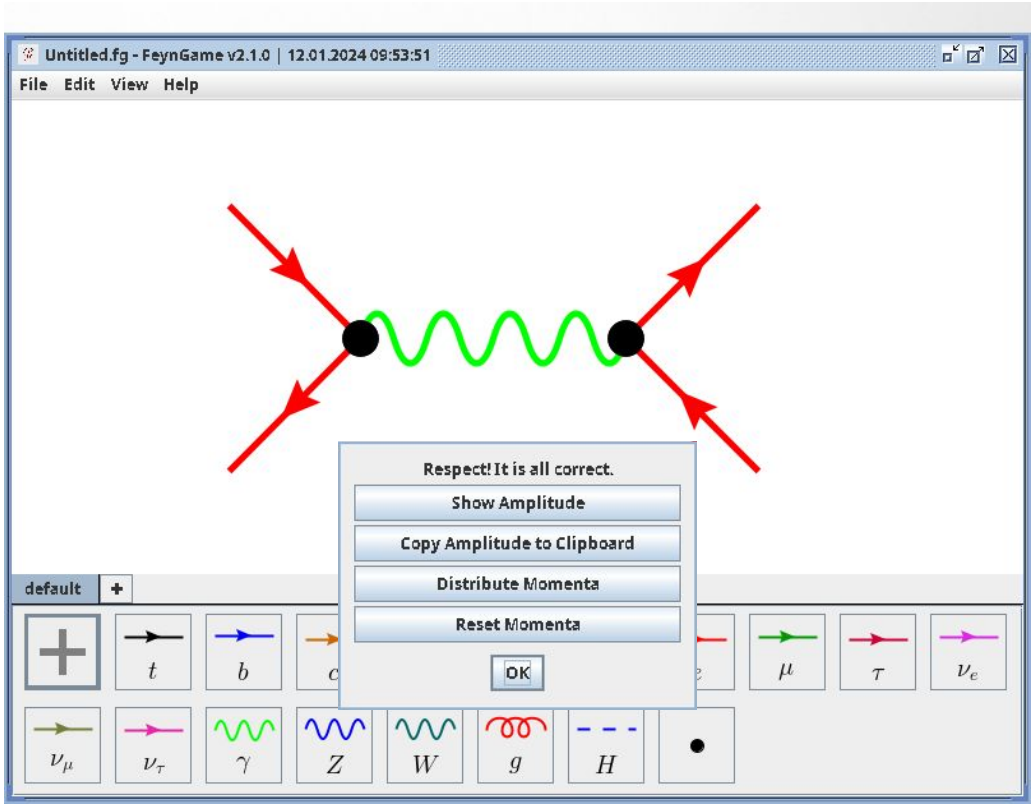
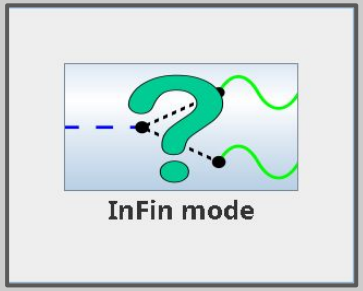
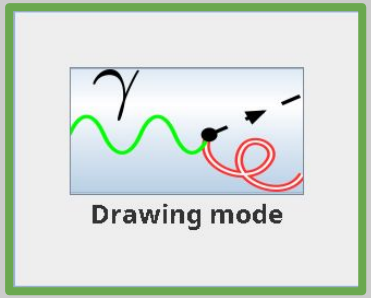


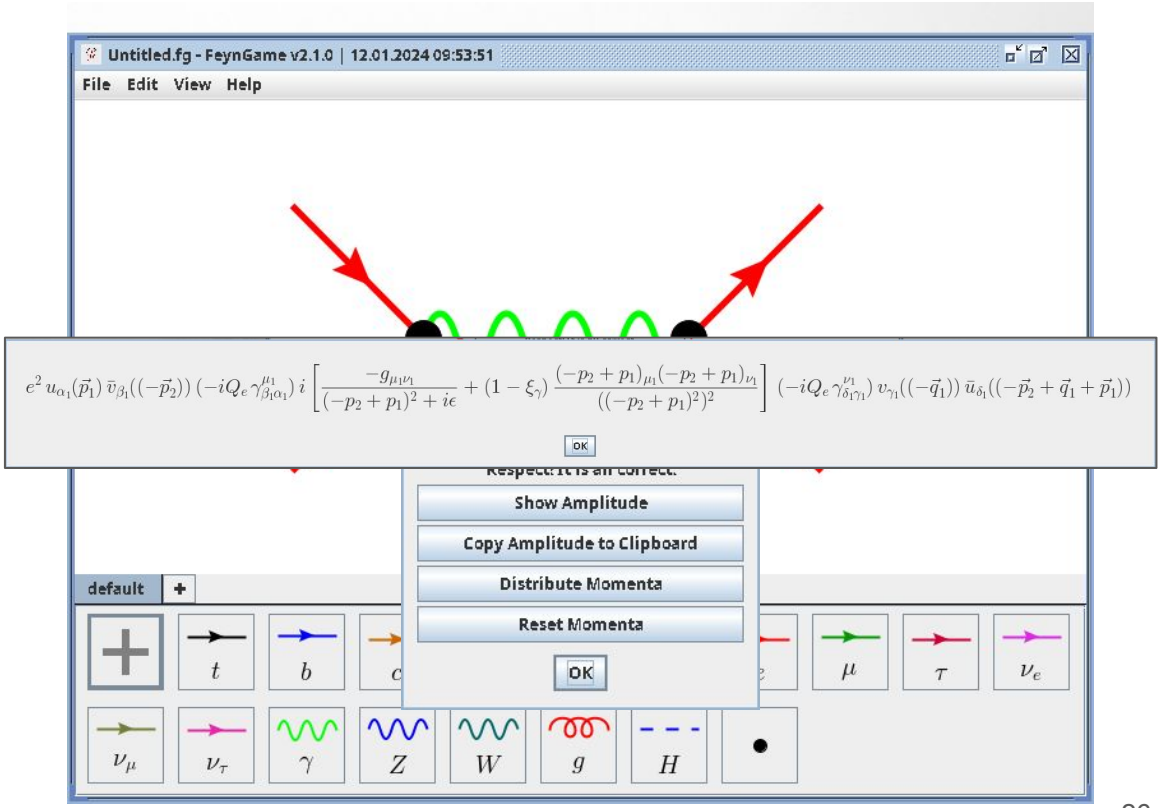




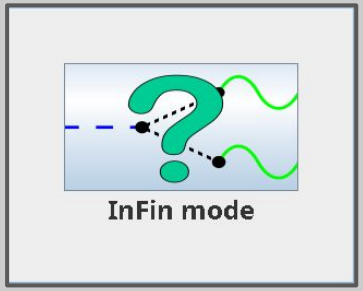
Drawing Feynman Diagrams

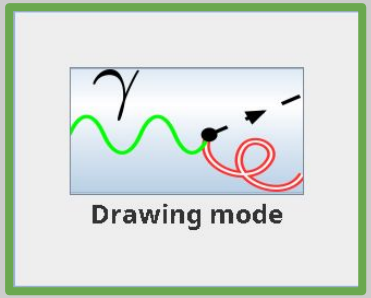


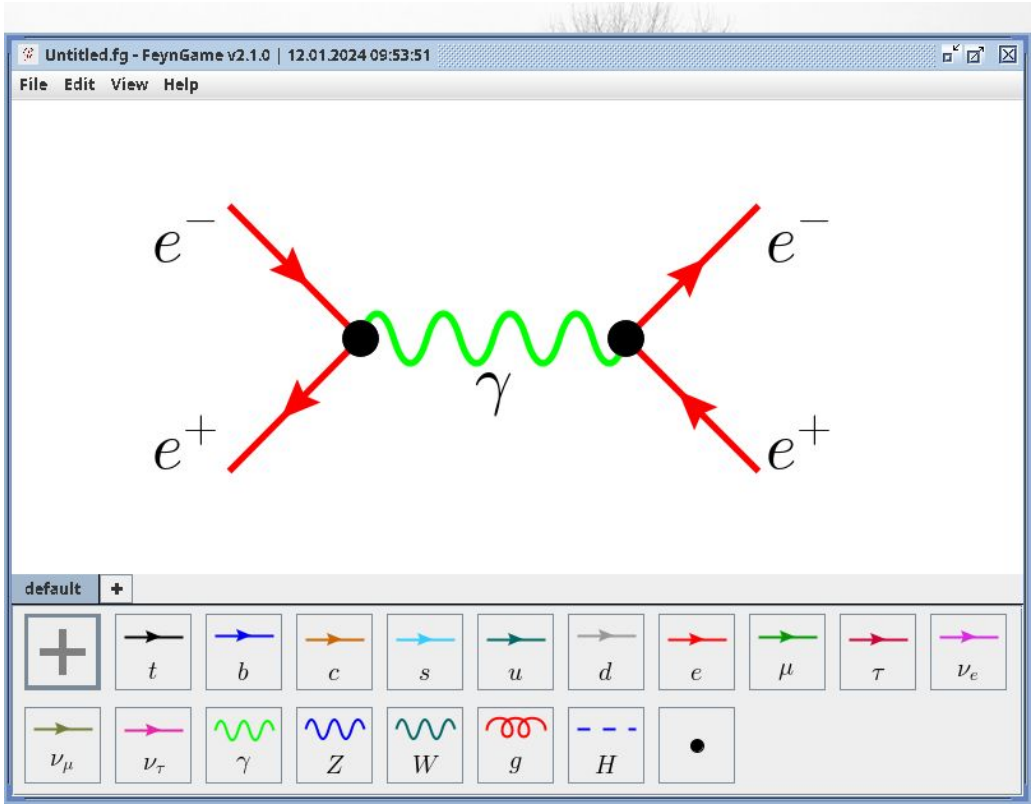




Drawing Feynman Diagrams

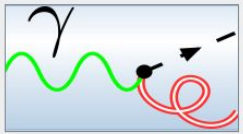


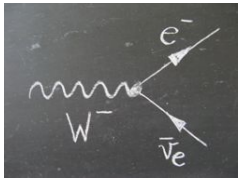


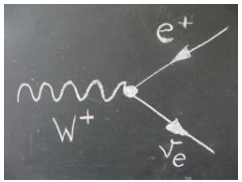


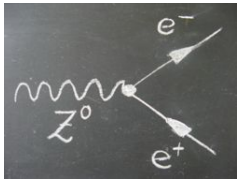
FeynGame in Outreach

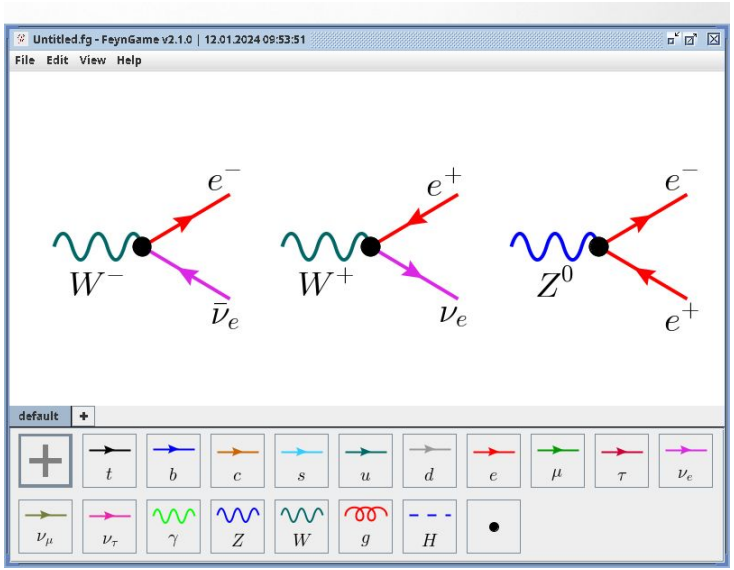
InFin mode


Drawing mode



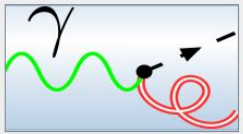






FeynGame in Outreach

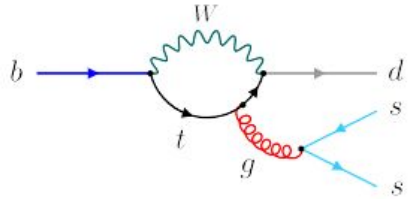
InFin mode



Drawing mode

Aufgabe 3 *Diagramme*

Das folgende Diagramm wird unter Physikern auch „Pinguin Diagramm“ genannt:



Zeichne das Diagramm in *FeynGame* nach. Versuche das Diagramm durch verschieben der Vertices und krümmen der Linien so zu verändern, dass der Name „Pinguin Diagramm“ einen Sinn ergibt.

Es gibt weitere Diagrammbezeichnungen, wie z.B.

- Sonnenaufgangs Diagramm
- Kaulquappen Diagramm
- Leiter Diagramm
- Tennisplatz Diagramm
- Mercedes Diagramm

Versuche zu jeder Bezeichnung ein passendes Diagramm zu entwerfen.

Summary

https://web.physik.rwth-aachen.de/user/harlander/software/feyngame/

FeynGame

Current developers:
Robert Harlander, Sven Yannick Klein, Magnus Schaaf

Authors:
Robert Harlander, Sven Yannick Klein, Maximilian Lipp, Magnus Schaaf

Other contributors:
Erik de la Haye, Lars Bündgen

Quick Start | Model Files | GitLab Repository | Citation | YouTube | License

Quick Start

- Download FeynGame.jar, then type "`java -jar FeynGame.jar`" (or double-click FeynGame.jar). This opens a dialog window where you can choose to just draw diagrams, or to play a game.
- On MacOS, you can also download FeynGame.dmg, double-click it, and move the FeynGame .app to your `/Applications` folder
- If you only have an ancient version of Java, you can also use this FeynGame.jar, or this FeynGame.dmg.

Model Files

By default, FeynGame assumes the Standard Model as the underlying theory, with pre-defined line and vertex styles. Here we collect a number of alternative model files. This list will be regularly updated.

model file	Name	Remarks	Style
`standard.model`	Standard Model	full Feynman rules; default model after 01 Jan 2024	
`qed.model`	QED	full Feynman rules	
`sqed.model`	Scalar QED	full Feynman rules	

GitLab Repository

The source code of FeynGame is available at this gitlab repository

Citation

If you use FeynGame in a publication, please refer to

- R. Harlander, S.Y. Klein, M. Schaaf, *FeynGame 2.1 – Feynman diagrams made easy*, [arXiv:2401.12778]
- R. Harlander, S.Y. Klein, M. Lipp, *FeynGame*, Comput. Phys. Commun. 256 (2020) 107465 [arXiv:2003.00896]

YouTube

See the FeynGame YouTube channel.

License

FeynGame is published under the GNU General Public Licence 3

Summary

FeynGame:

- Program:
  - open source
  - Java (works on almost any machine)
  - active development
- Outreach:
  - simplified models
  - checks for validity
- Research:
  - diagrams completely customizable
  - exportable for slides and papers

Outlook:

- extend *InFin* mode
- add *tutorial* mode

Feynman diagrams for **everyone**: *beginners*, *intermediates*, and *experts*

https://web.physik.rwth-aachen.de/user/harlander/software/feyngame/

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