Leptonic EDM's from Heavy Right-Handed Neutrinos

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Tatsu Takeuchi

with

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Non-zero d violates P and CP.

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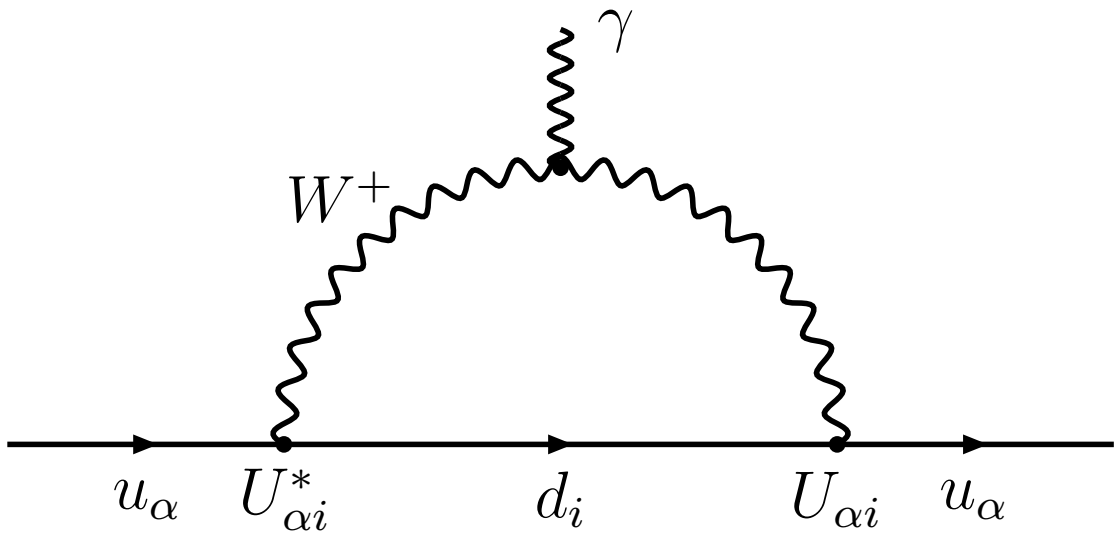
  - Lepton EDM's generated at the 2-loop level

1-loop diagram



$$\propto |U_{\alpha i}|^2$$

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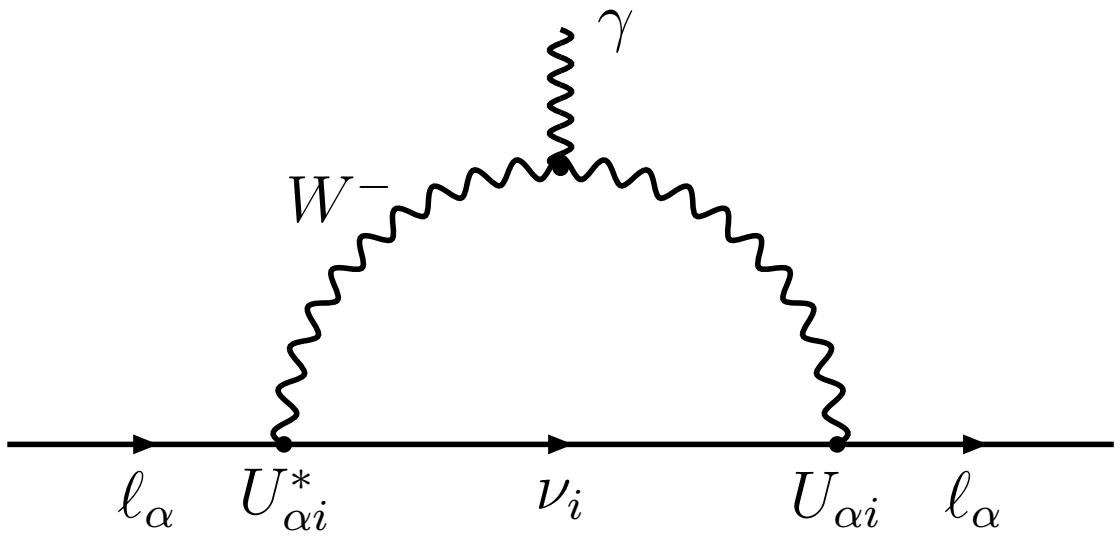

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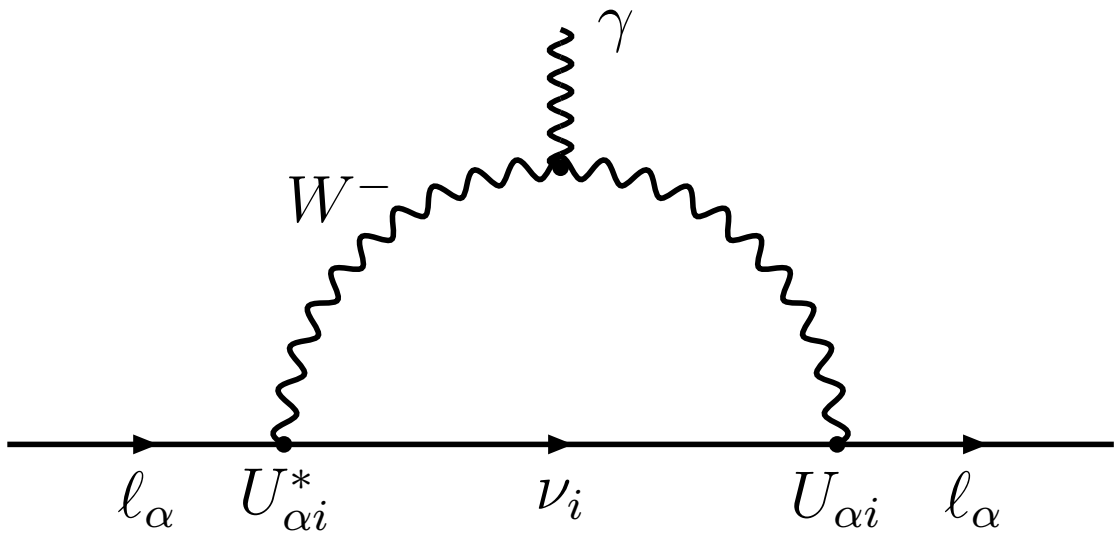

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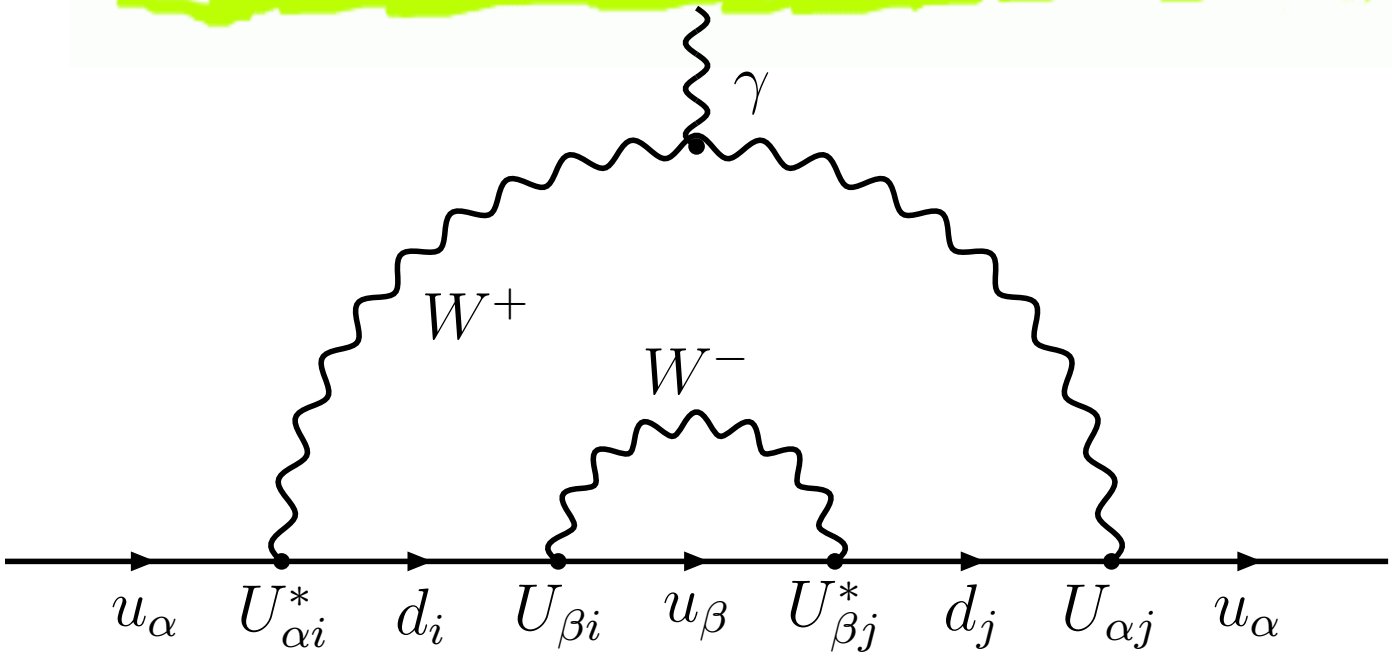
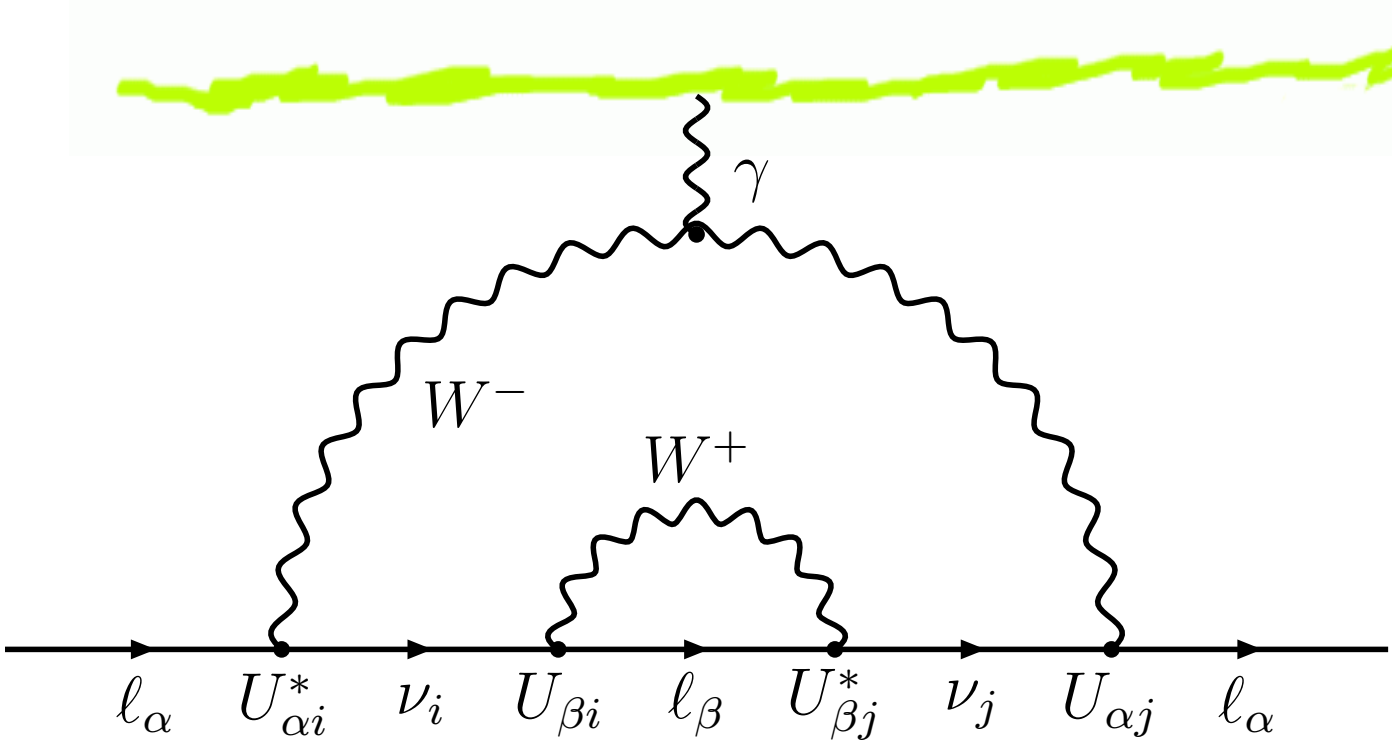
Insensitive to complex phases

2-loop diagram



$$\propto (U^*_{\alpha i} U_{\beta i})(U_{\alpha j} U^*_{\beta j})$$

2-loop diagram



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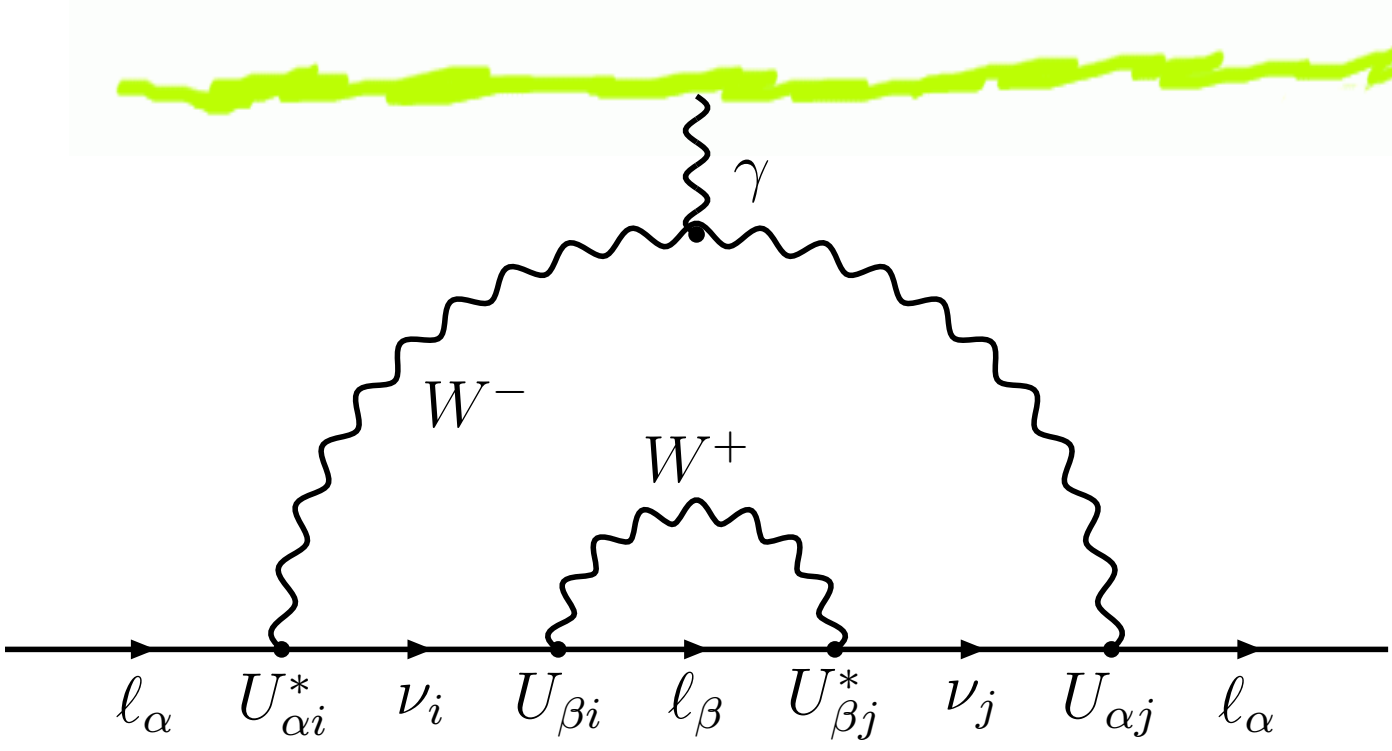

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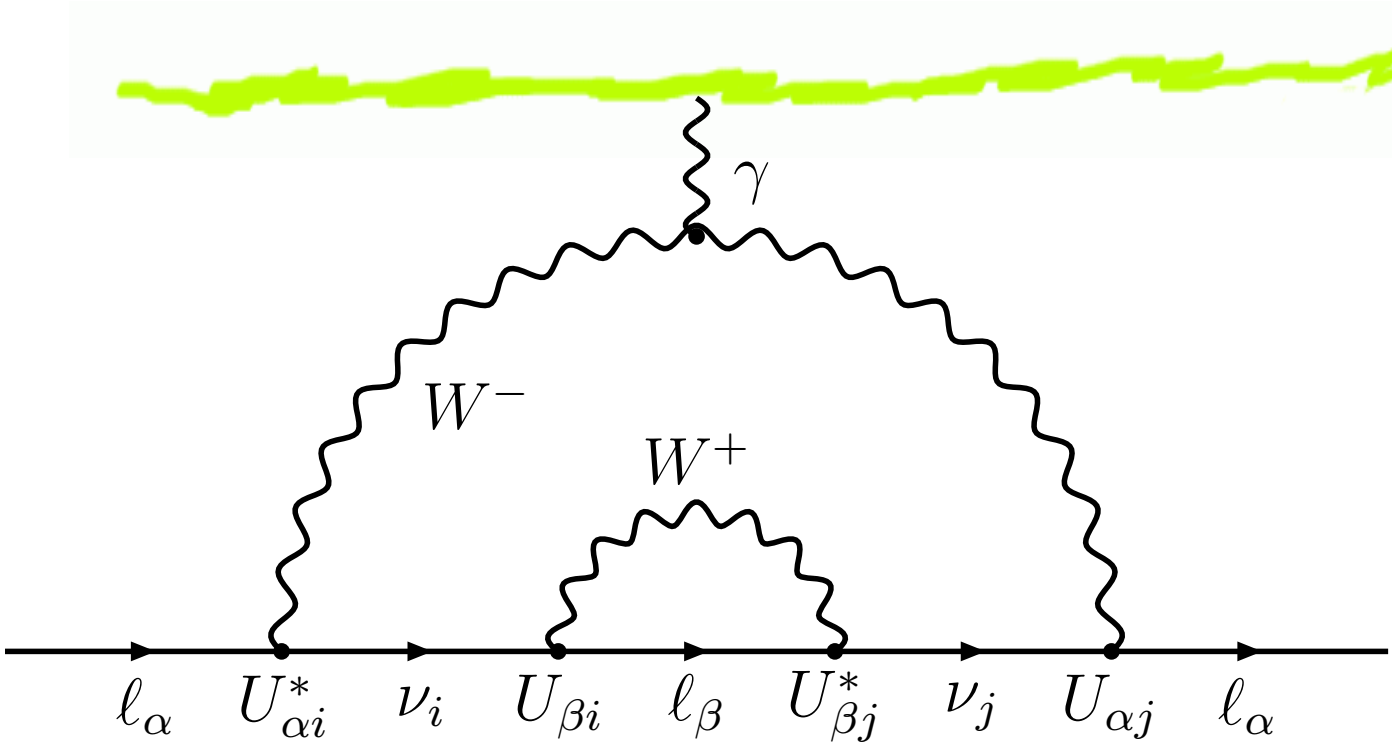

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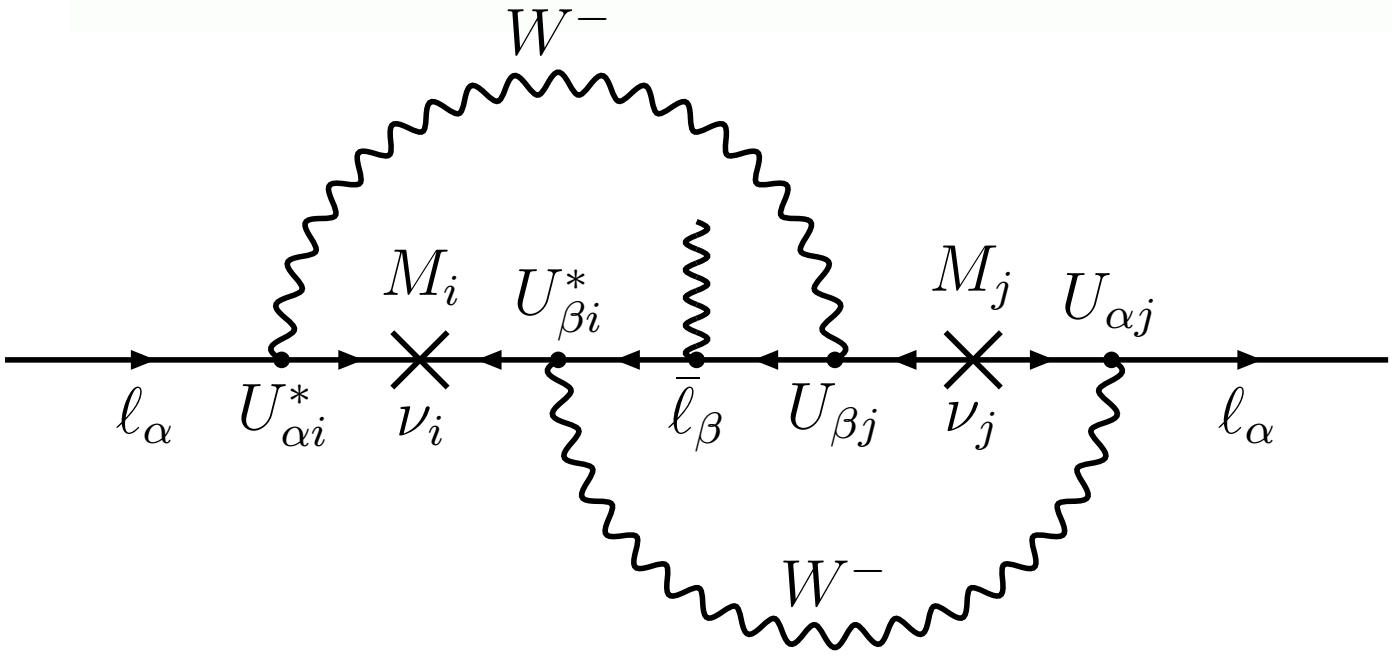
Shabalin, Sov. J. Nucl. Phys. 28 (1978) 75

2-loop diagram unique to leptons



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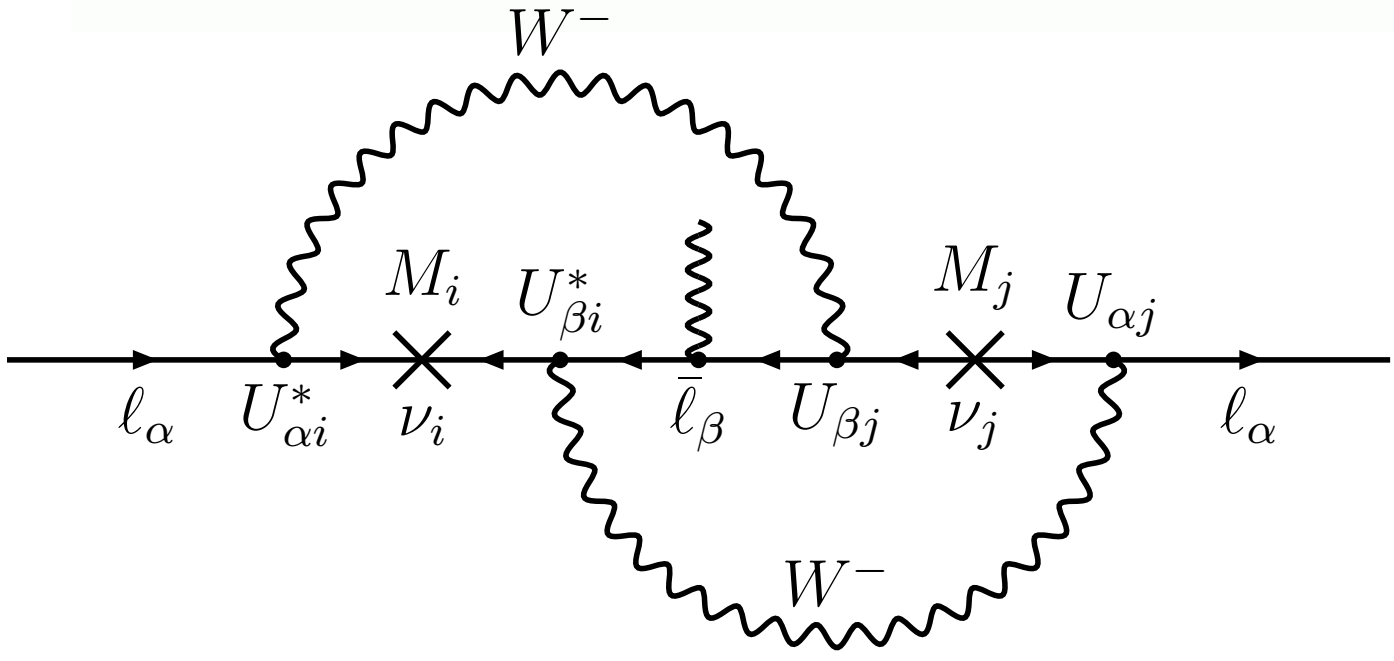

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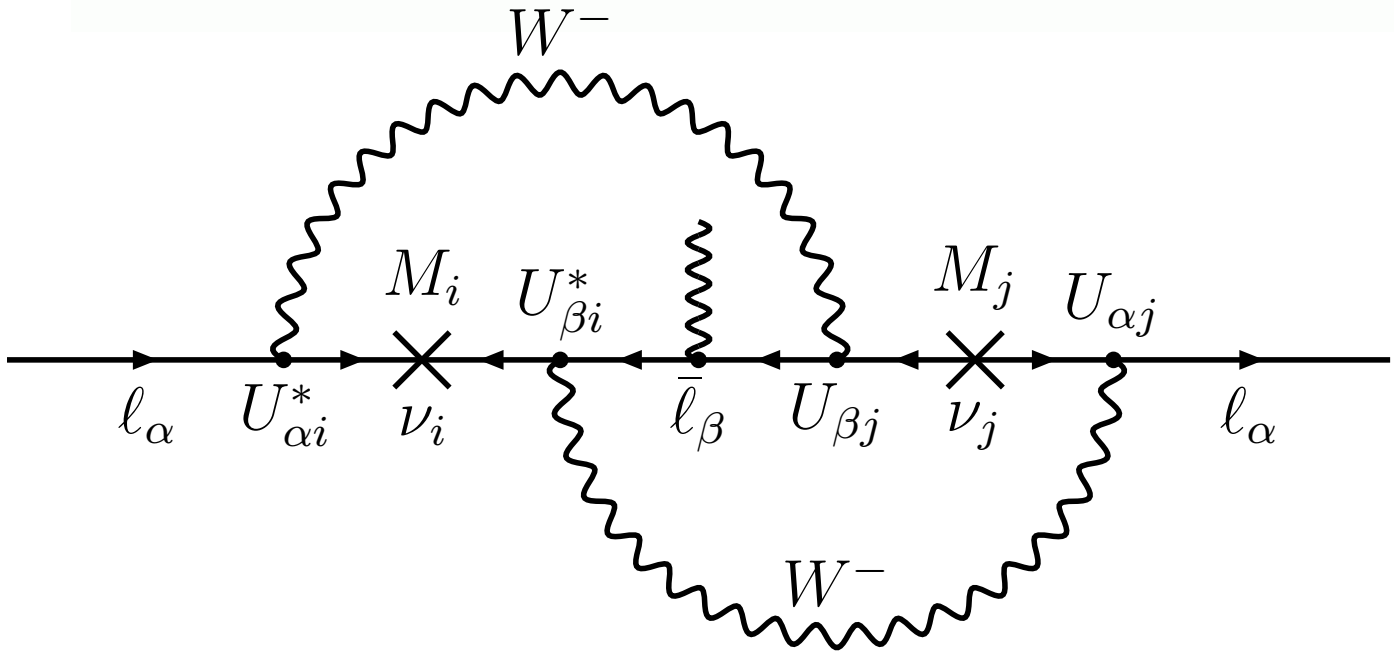

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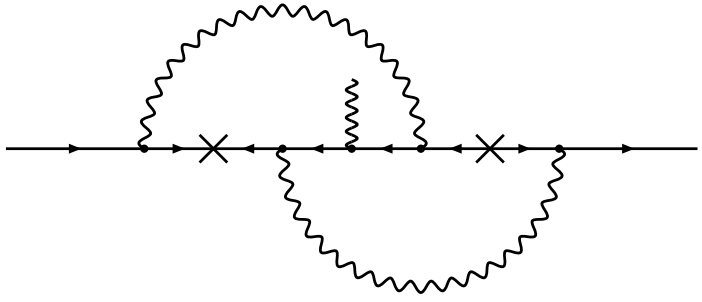

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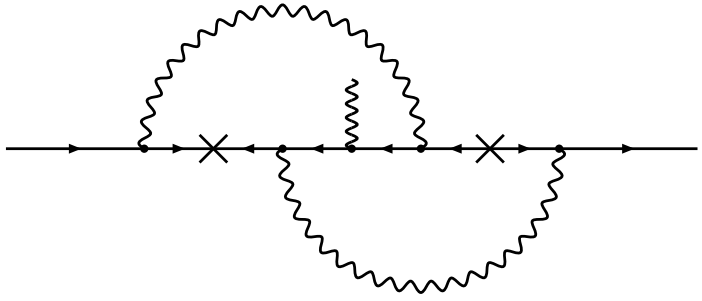

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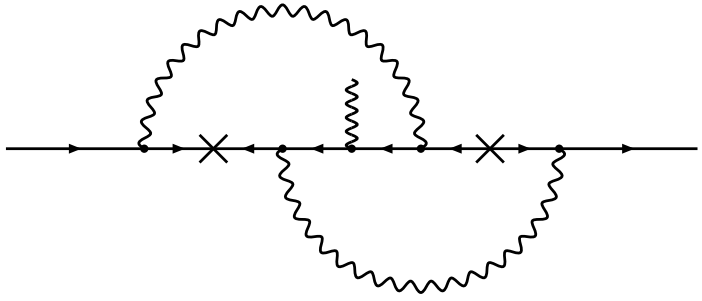

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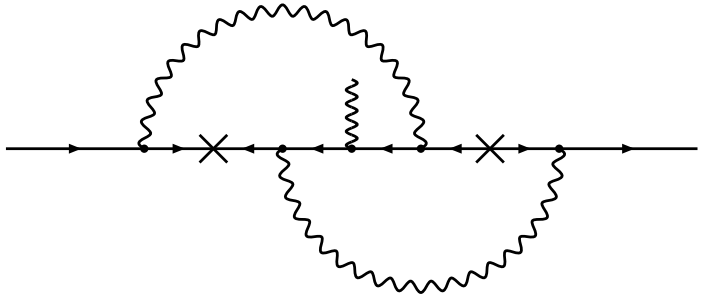

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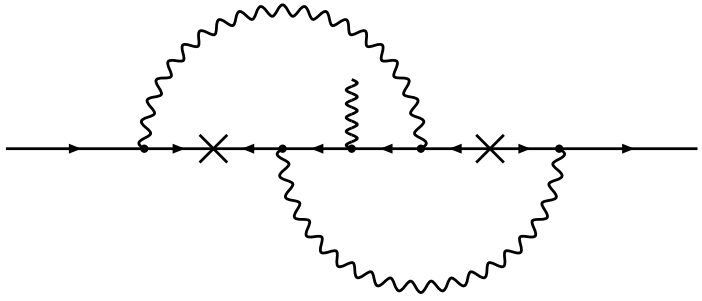

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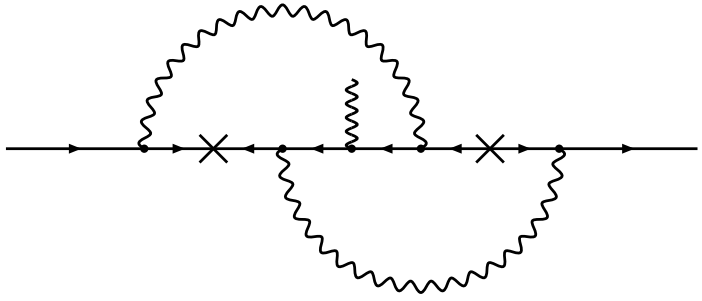

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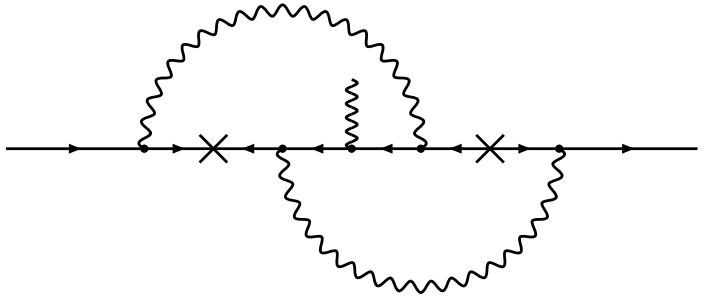

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  $\rightarrow$ same order as the light neutrino contribution.

TeV-Scale Seesaw Models

Example: Okamura Texture PRD 68, 073001 (2003)

$$\begin{bmatrix} 0 & 0 & 0 & \alpha D & \beta D & \gamma D \\ 0 & 0 & 0 & \alpha D & \beta D & \gamma D \\ 0 & 0 & 0 & \alpha D & \beta D & \gamma D \\ \alpha D & \alpha D & \alpha D & \alpha M & 0 & 0 \\ \beta D & \beta D & \beta D & 0 & \beta M & 0 \\ \gamma D & \gamma D & \gamma D & 0 & 0 & \gamma M \end{bmatrix}$$

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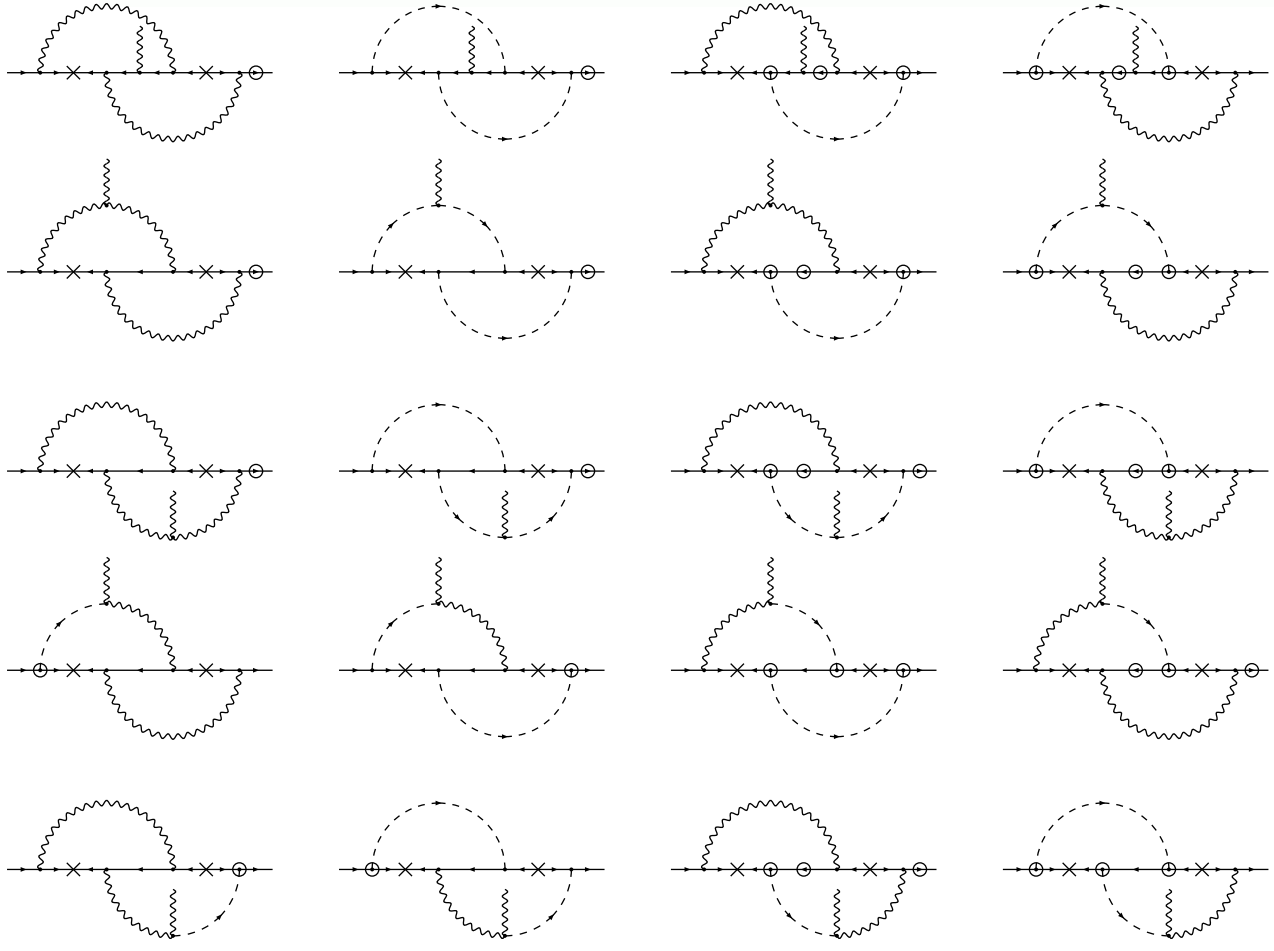
  $\rightarrow$ lepton EDM's can be large!?

20 Diagrams



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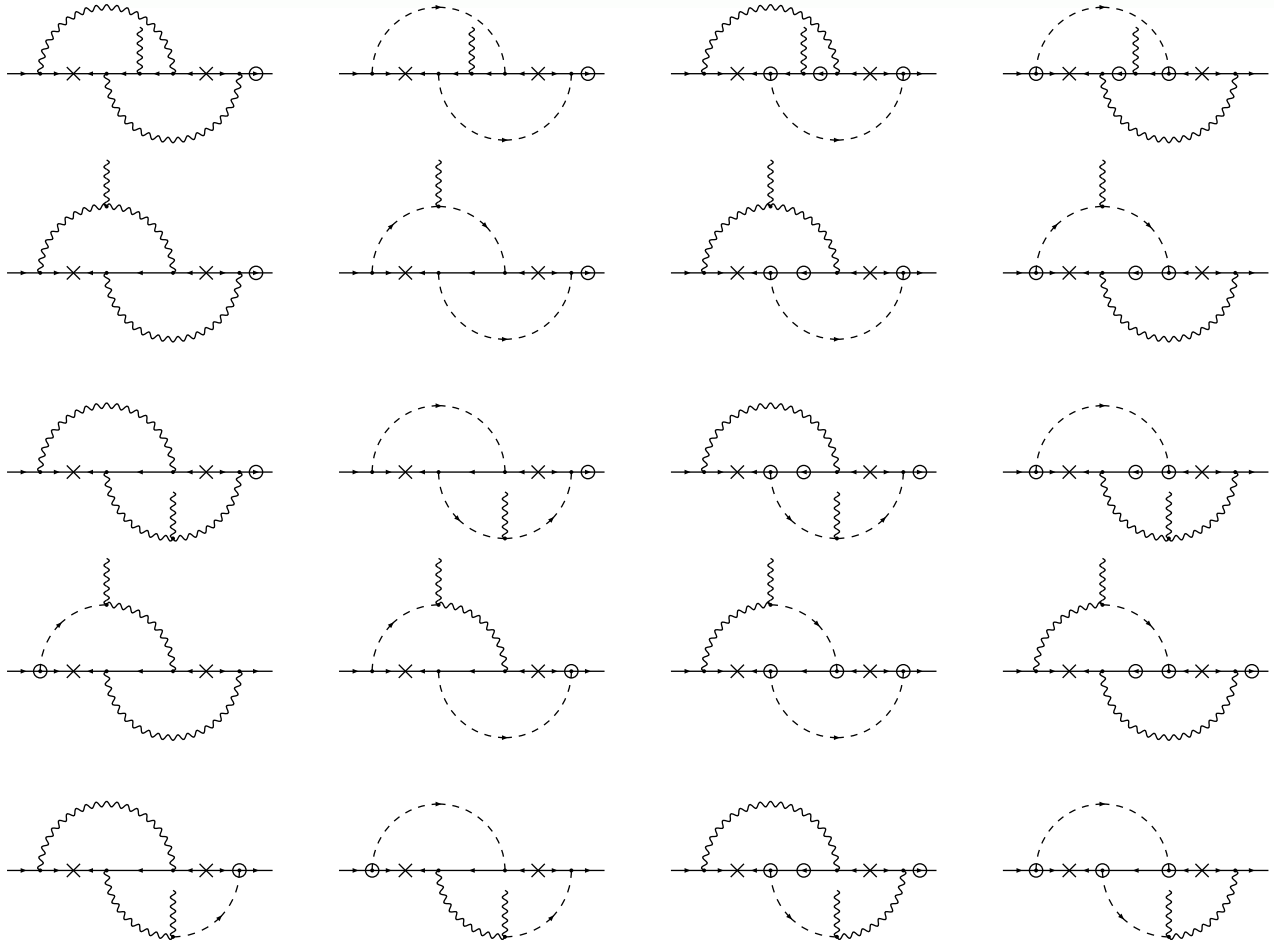

Give to graduate student!

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- Paper in preparation.

Numerical Results

Current Experimental Limits:

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Preliminary Result for Okamura Model:

$$d_e \leq O(10^{-28})\,\mathrm{e}\cdot\mathrm{cm}$$

(Actual number depends on choice of parameters.)