

1999 (#4)

# PHYSICAL REVIEW LETTERS

*moving physics forward*

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PRL Milestone

## Evidence for Oscillation of Atmospheric Neutrinos

Phys. Rev. Lett. **81**, 1562 – Published 24 August 1998

Y. Fukuda *et al.* ((Super-Kamiokande Collaboration))

 See Focus story: [Neutrinos Have Mass](#)

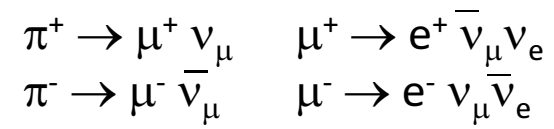
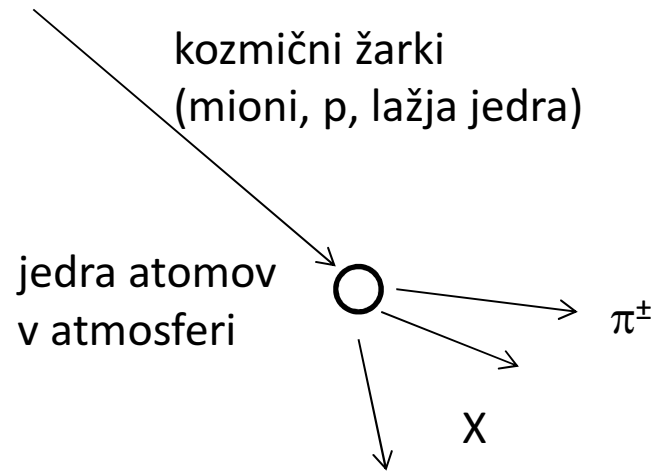
Podoben rezultat  
že l. 1994, detektor  
Kamiokande

PDF

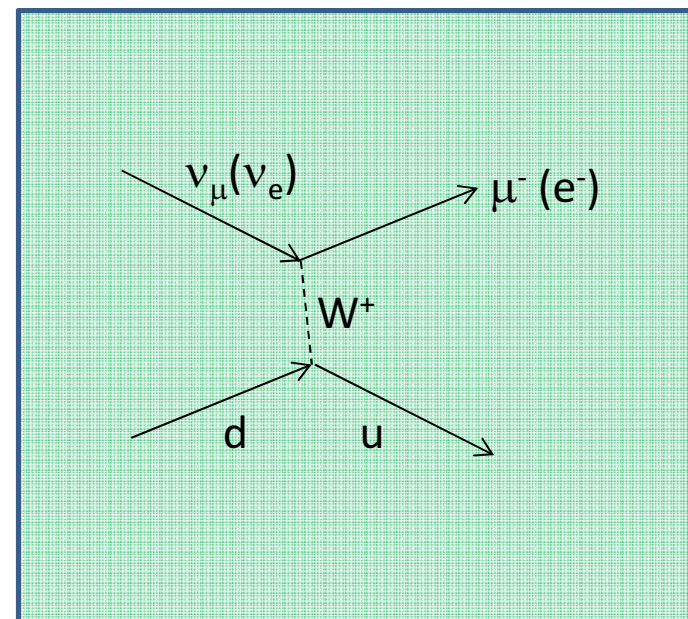
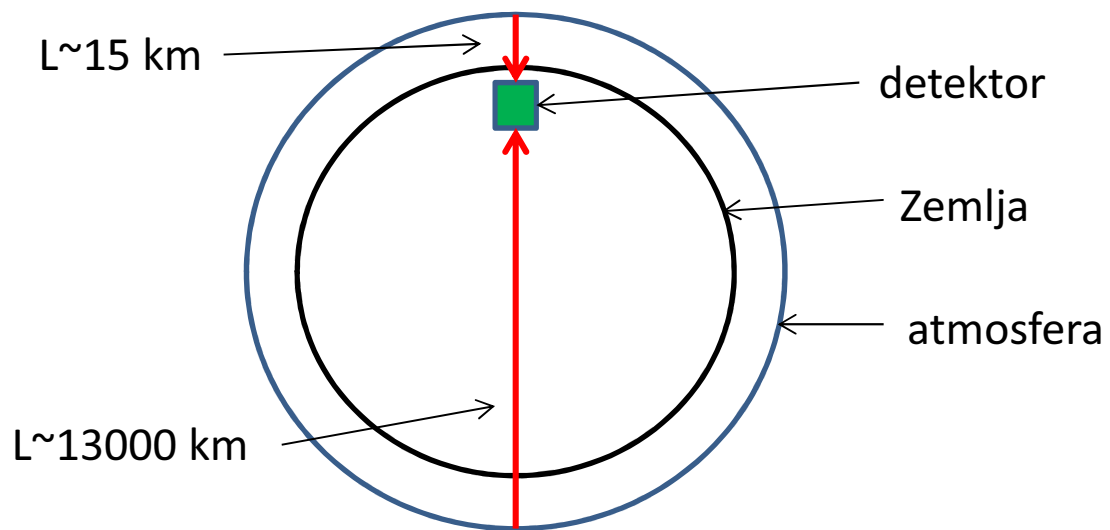
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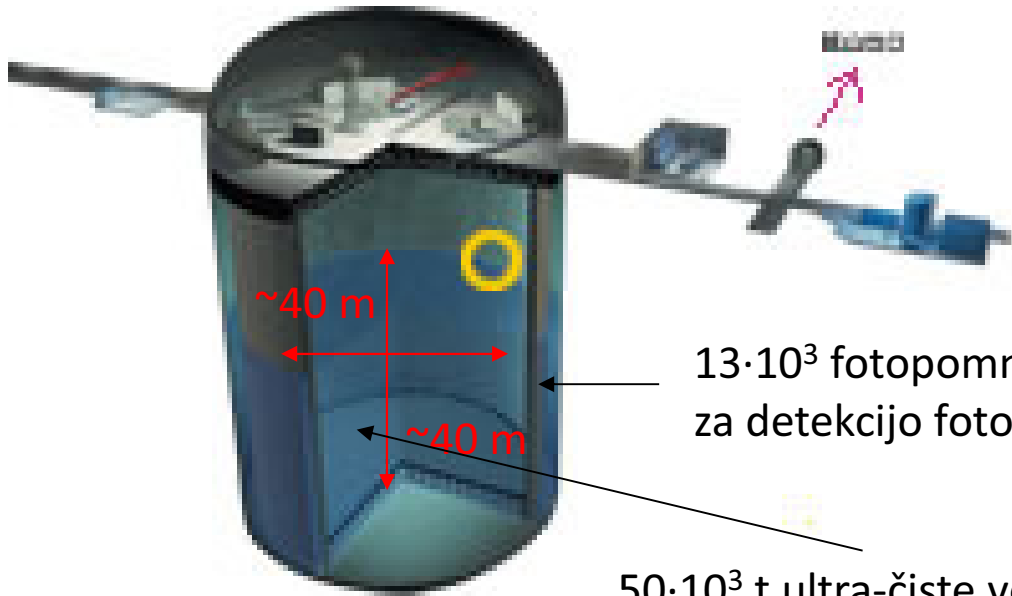
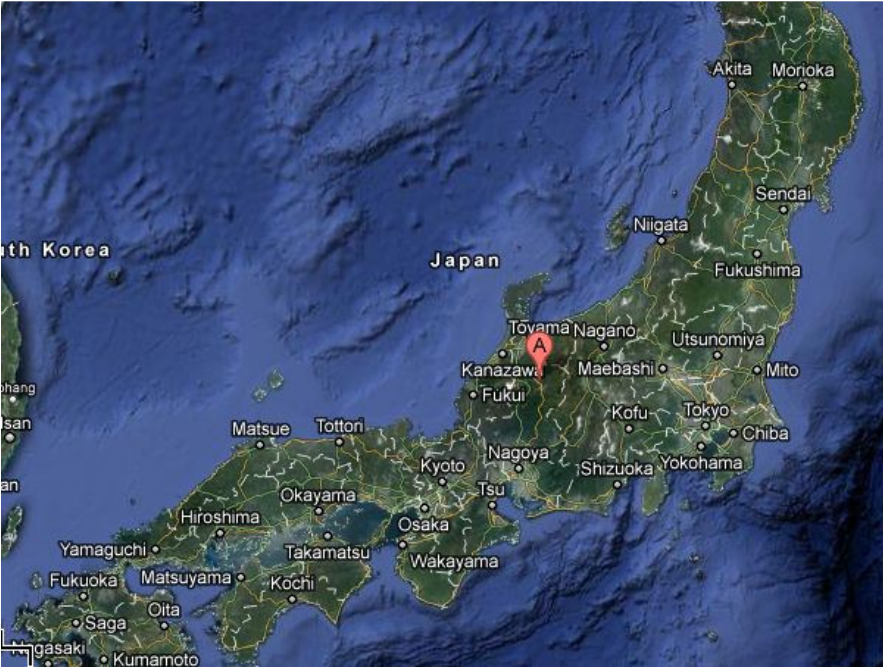
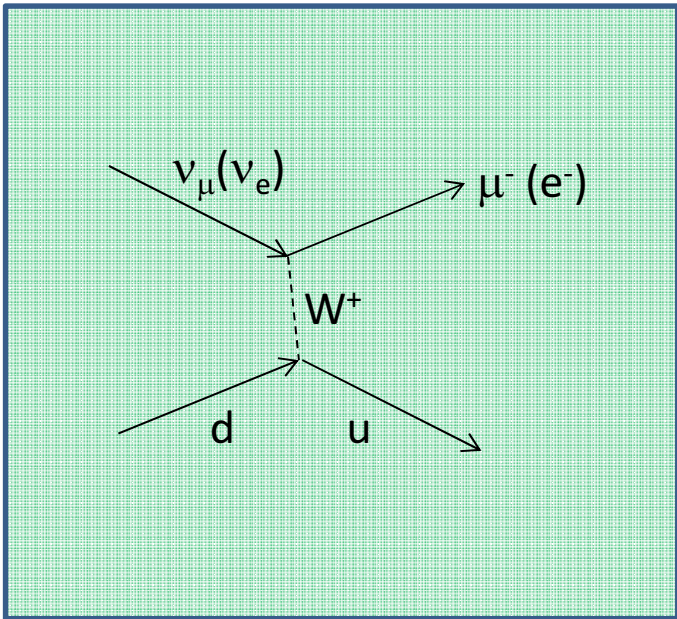
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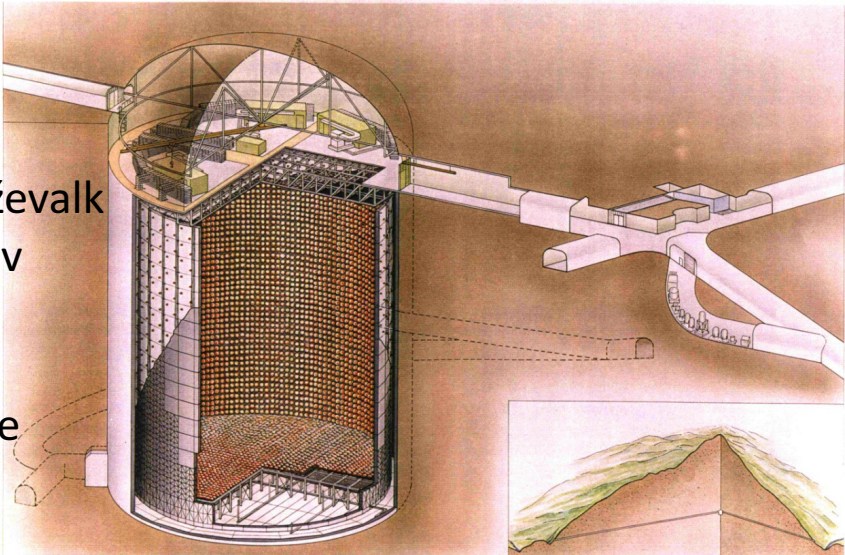
$$R = (\nu_\mu + \bar{\nu}_\mu) / (\nu_e + \bar{\nu}_e) \sim 2$$



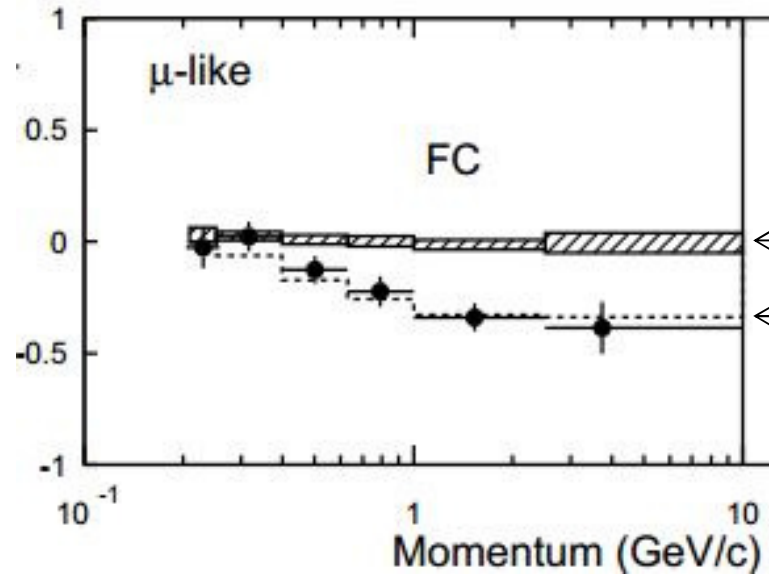


$13 \cdot 10^3$  fotopomnoževalk  
za detekcijo fotonov

$50 \cdot 10^3$  t ultra-čiste vode



$$[N(\text{upgoing}) - N(\text{downgoing})] / [N(\text{upgoing}) + N(\text{downgoing})]$$



brez nevtrinskih oscilacij

izmerjeno

dokaz za  $\nu_{\mu} \rightarrow \nu_{\tau}$  (ali  $\nu_X$ )

$$\sin^2 2\theta > 0.82$$

$$5 \cdot 10^{-4} \text{ eV}^2 < \Delta m^2 < 6 \cdot 10^{-3} \text{ eV}^2$$