Relativity — Lecture 7

- **Summary of Lecture 6**
- **Relativistic Mechanics**

04/12/2007

Imperial College London
100 years of living science
Patrick Koppenburg

Announcement

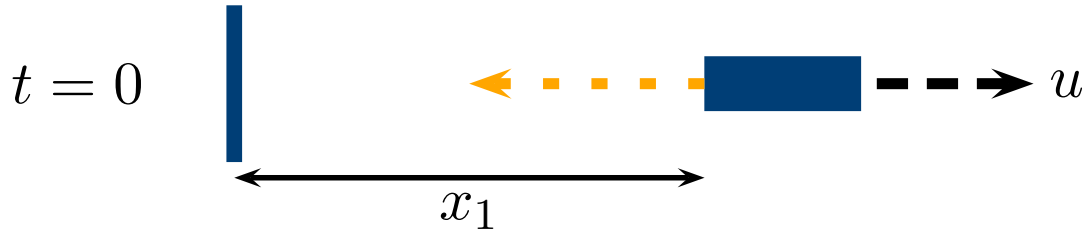
Thursday 6 December

- The Maths lecture at 4.00 has been cancelled
- The Mechanics lecture will take its place (instead of 5.00)

Lecture 6

Revision

Relativistic Doppler Effect



Event 1: Emission of the first pulse at $x'_1 = 0,\ t'_1 = T$.

Relativistic Doppler Effect

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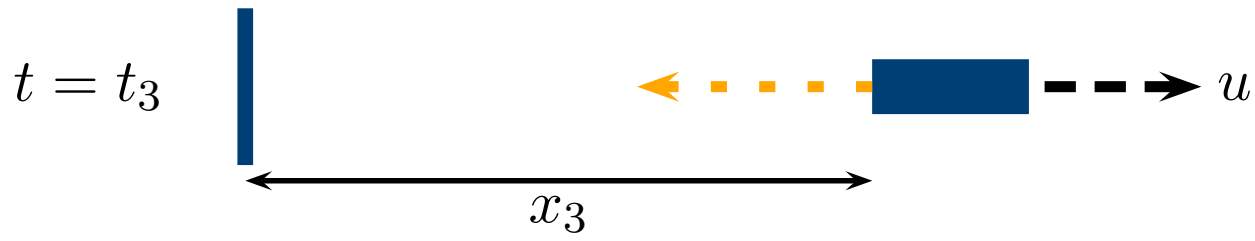
Event 2: Reception of the first pulse.

Relativistic Doppler Effect



Event 1: Emission of the first pulse at $x'_1 = 0,\ t'_1 = T$.

Event 2: Reception of the first pulse.

Event 3: Emission of the second pulse at $x'_3 = 0,\ t'_1 = T + \tau_0$.

Relativistic Doppler Effect

Event 1: Emission of the first pulse at $x'_1 = 0,\ t'_1 = T$.

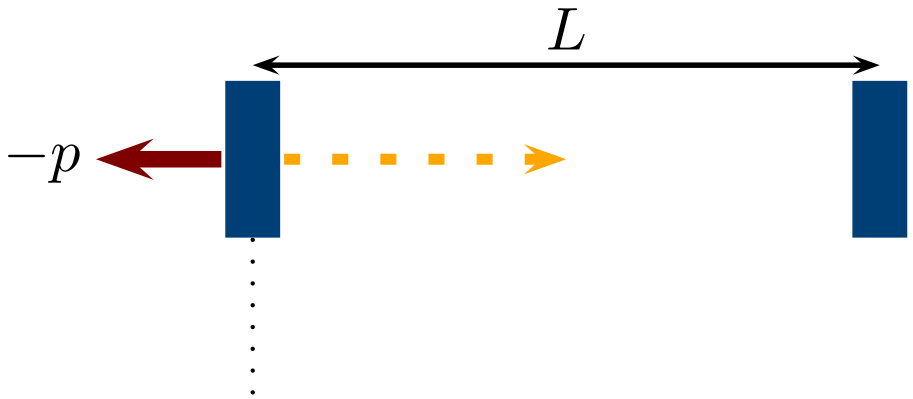
Event 2: Reception of the first pulse.

Event 3: Emission of the second pulse at $x'_3 = 0,\ t'_1 = T + \tau_0$.

Event 4: Reception of the second pulse.

$$\rightarrow \qquad \frac{f}{f_0} = \sqrt{\frac{1-\beta}{1+\beta}},$$

Light Clock



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$$mL + M\Delta x = 0 \quad \rightarrow \quad m = -\frac{M}{L}\Delta x = \frac{M}{L}\frac{EL}{Mc^2} = \frac{E}{c^2},$$

$$\rightarrow \quad E = mc^2$$

This is not the mass of the photon!

Lecture 7