



Dual-colour hard X-ray generation from Tsinghua Thomson scattering X-ray source (TTX)

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Dual-energy hard X-ray generation introduction

- **Experimental facility and principle**
 - Dual-colour laser scheme
 - Dual-energy electron bunches scheme
 - Imaging and spectrum measurement system
- **Experimental results**

済業大学 Dual-energy hard X-ray generation introduction



D Pump-probe experiments

Dual-colour X-ray imaging or CT scans

 \checkmark chemical reactions

✓ diagnostic radiography

 \checkmark electronic evolutions

 \checkmark precise dose calculation

$E \downarrow_X \approx 4 \gamma \uparrow 2 E \downarrow L$

- For a head-on collision, the energy of the generated X-rays is determined by the combination of electron beam energy and laser photon energy.
- The two schemes for producing twocolour Compton radiation are achieved by changing the electron beam energy and changing the laser photon energy.

Dual-color lasers scheme





Dual-colour laser scheme



Layout of the TTX linac system



The imaging and spectrum measurement system

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Dual-colour hard X-ray generation from TTX

Dual-energy electron bunches scheme





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Experimental results





- Two schemes to demonstrate the generation of dual-colour X-rays based on Compton scattering
 - ✓ The interaction of one single electron beam with two light pulses, of which one is generated by the second harmonic generation (SHG) of the other.
 - ✓ The interaction of two different-energy electron bunches with two light pulses centred at the same wavelength
- The X-rays were spectrally measured by the images obtained by HOPG crystal diffraction
- The above two schemes can be designed with great flexibility to generate dual-colour hard X-ray pulses of energy intervals and of time intervals in principle



THANKS FOR YOUR TIME