Three-Halves-Harmonic Generation in Femtosecond Laser-Produced Plasmas in the Intensity Range $10^{16} - 10^{18}$ W/cm^2

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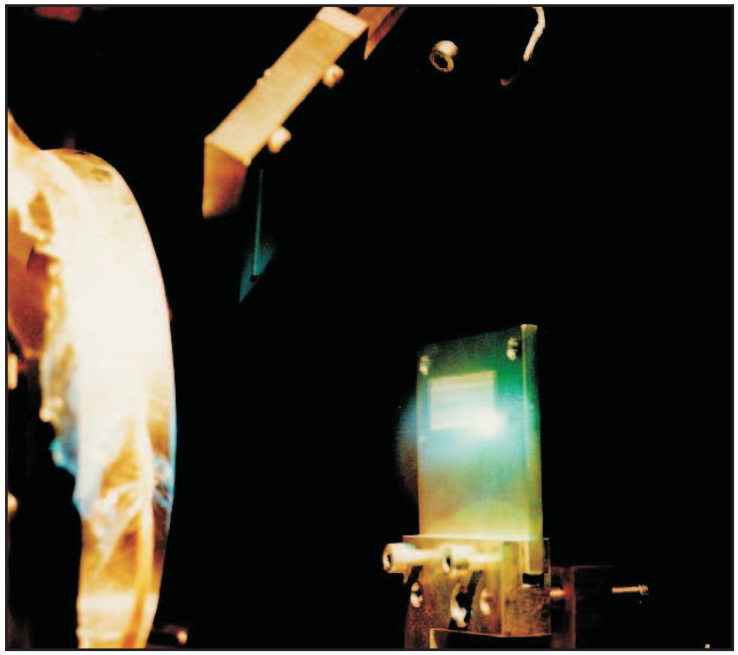

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Collaborators

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Summary

Good agreement is found with theoretical predictions based on the two-plasmon-decay instability within the framework of linear theory

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- Detailed measurements of the angular distribution of the $3\omega/2$-harmonic radiation in short-scale-length ($L/\lambda = 3$), femtosecond-laser-produced plasmas have been made.

- A characteristic double-peak structure at ~ 25° and 70° with respect to the surface normal has been measured in the reflection direction.

The interaction of Ti:sapphire femtosecond laser-pulses with solid targets produces an intense green emission

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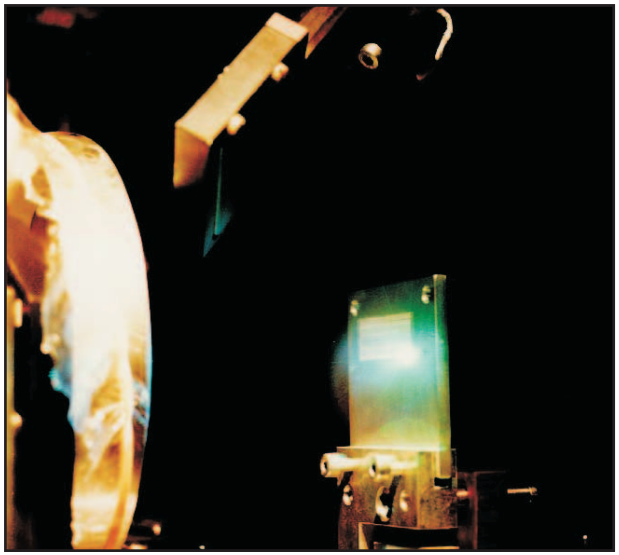

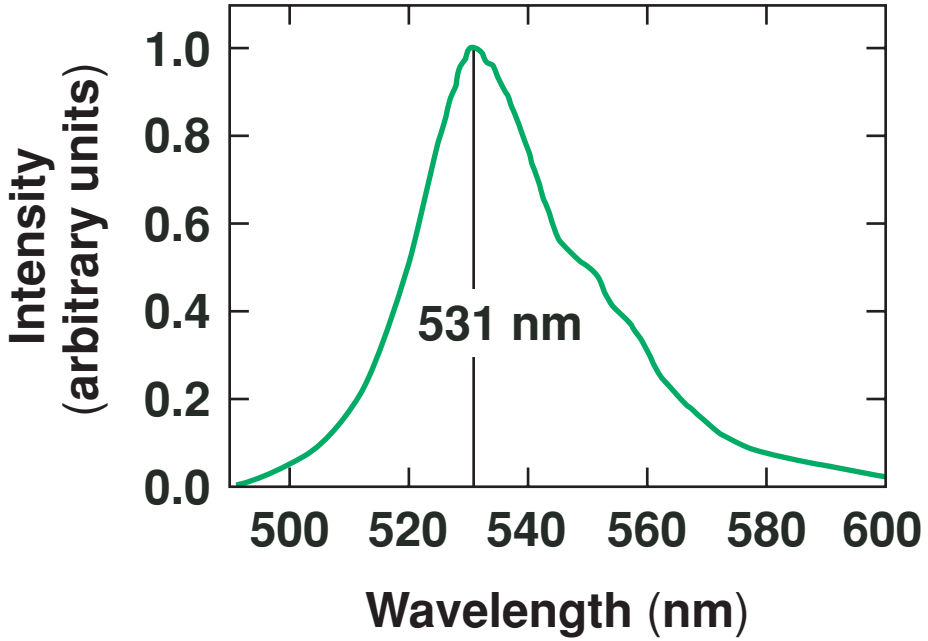

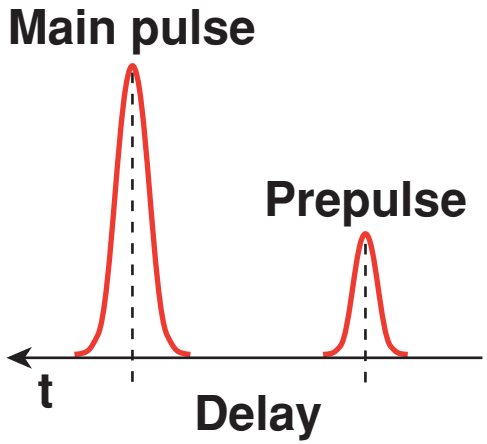

$\lambda = 800$ nm
Pulse duration: 100 fs

E12668

We have performed angularly resolved measurements of the 3ω/2-harmonics

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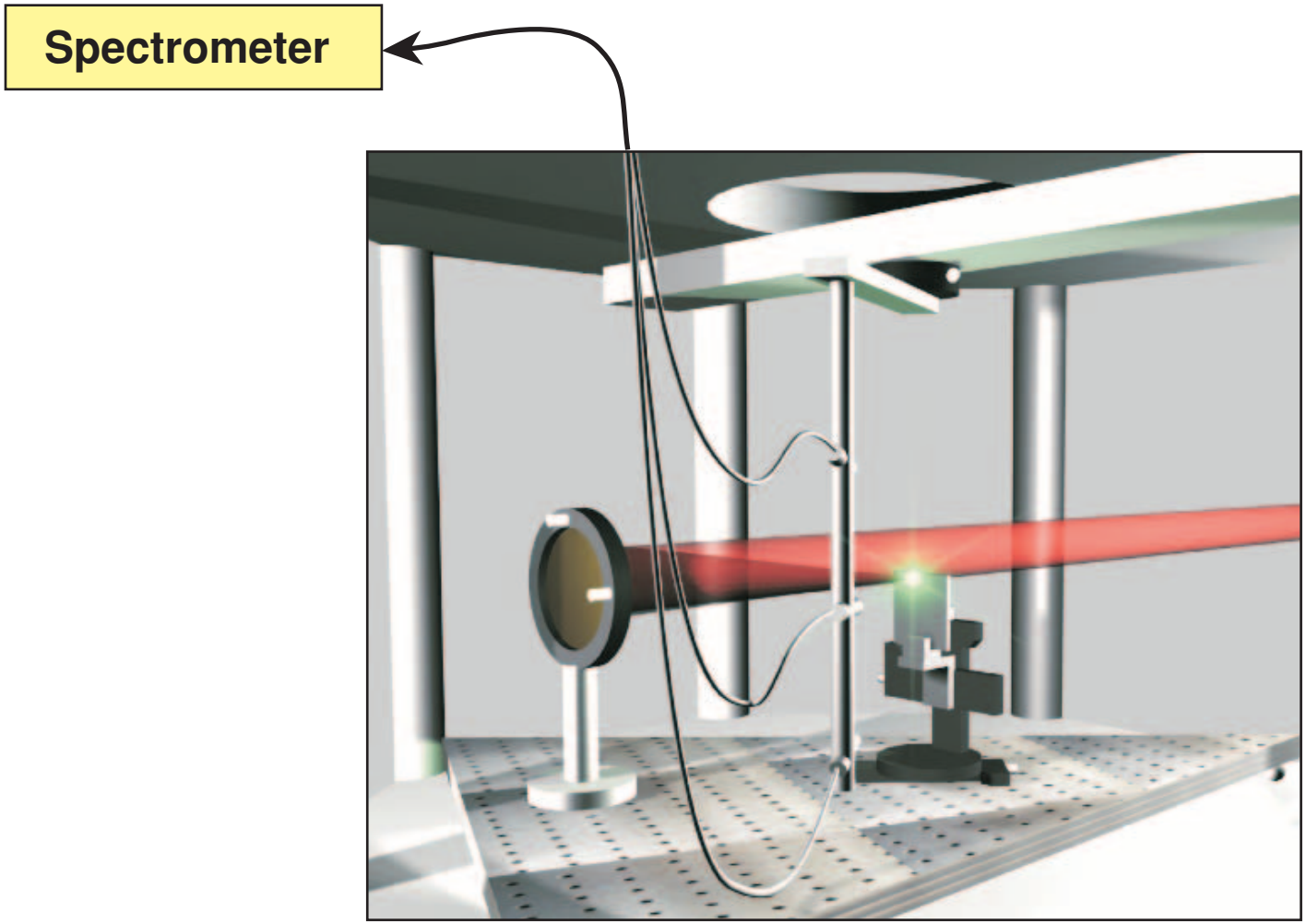
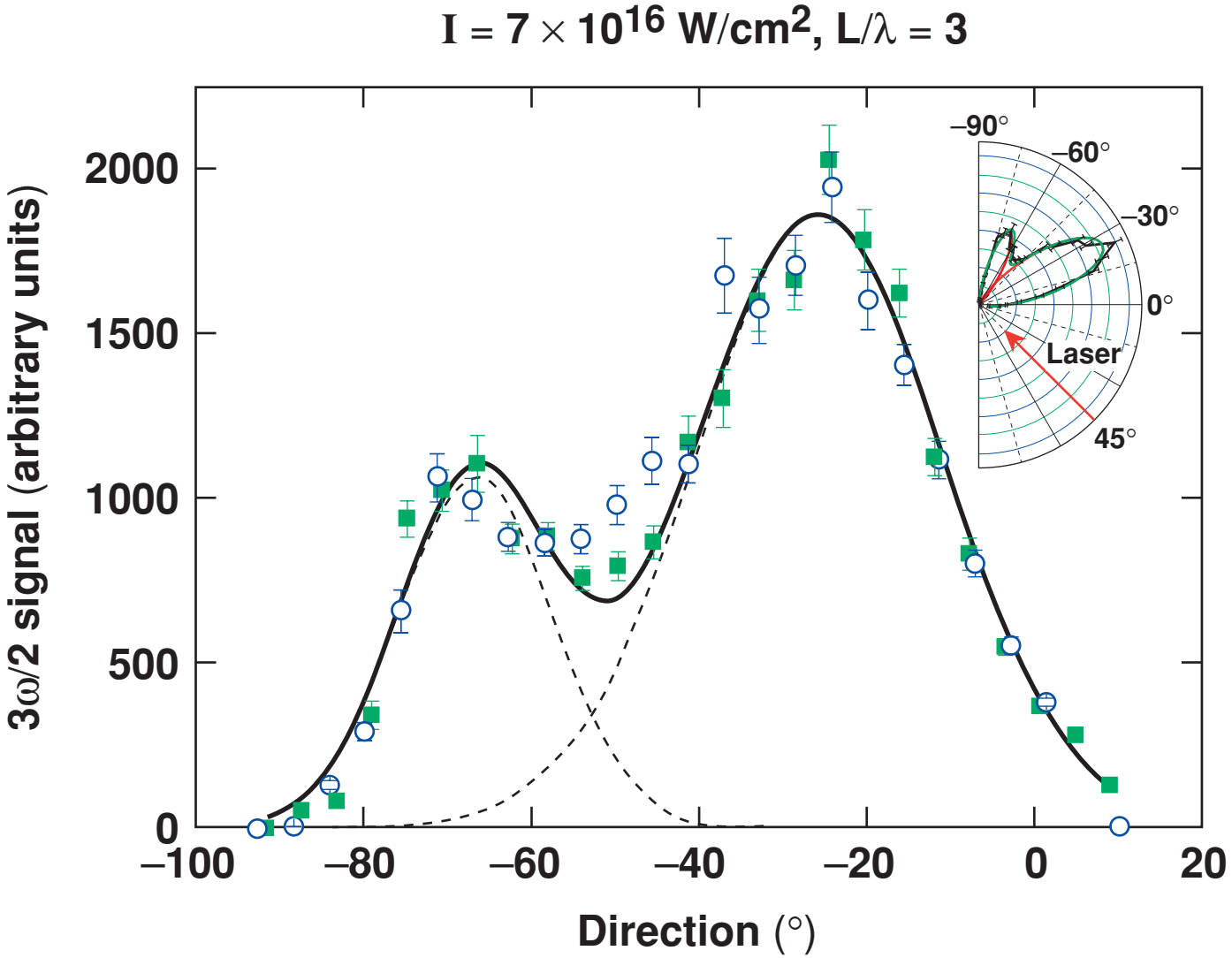
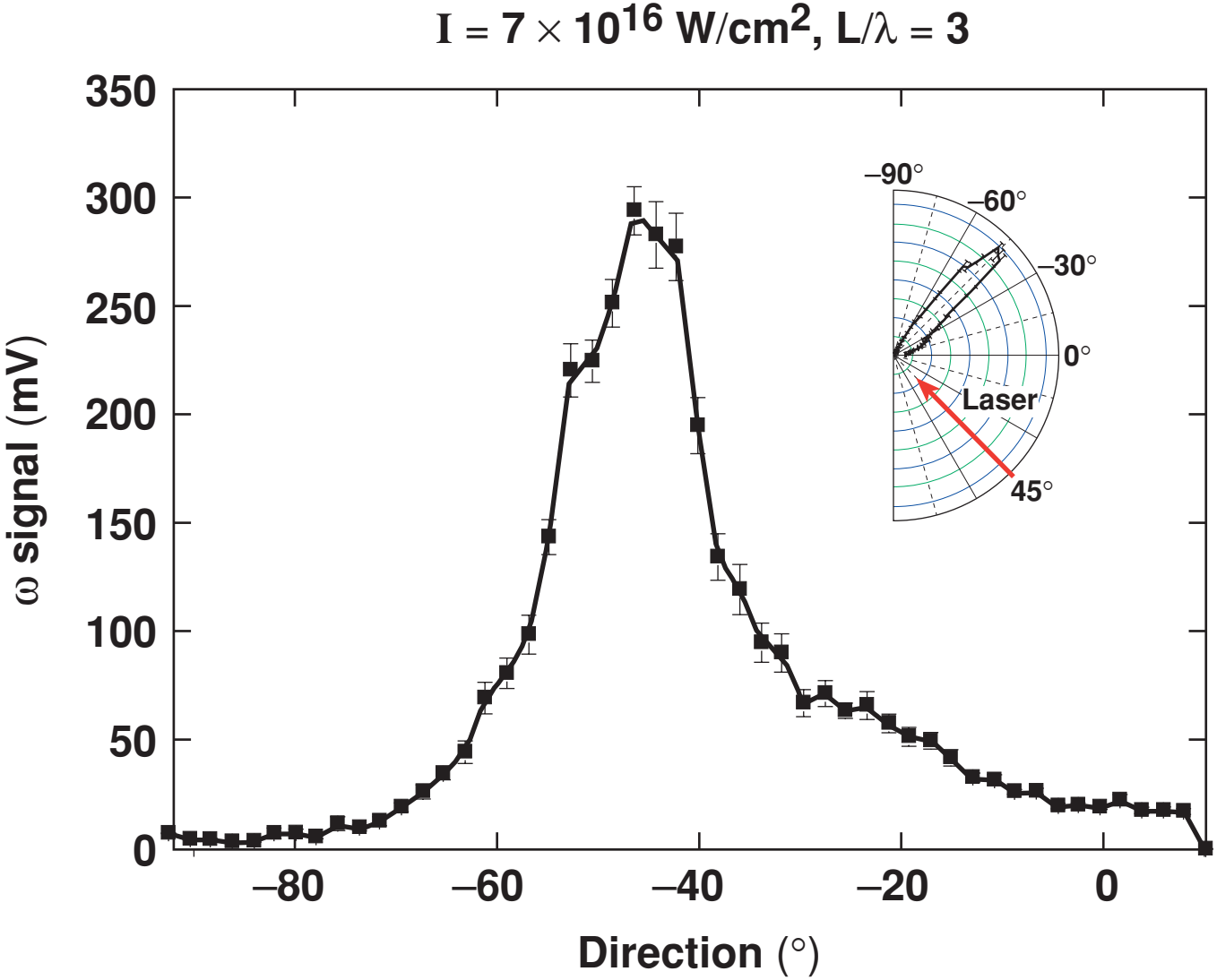


Angular measurement shows two distinct emission maxima



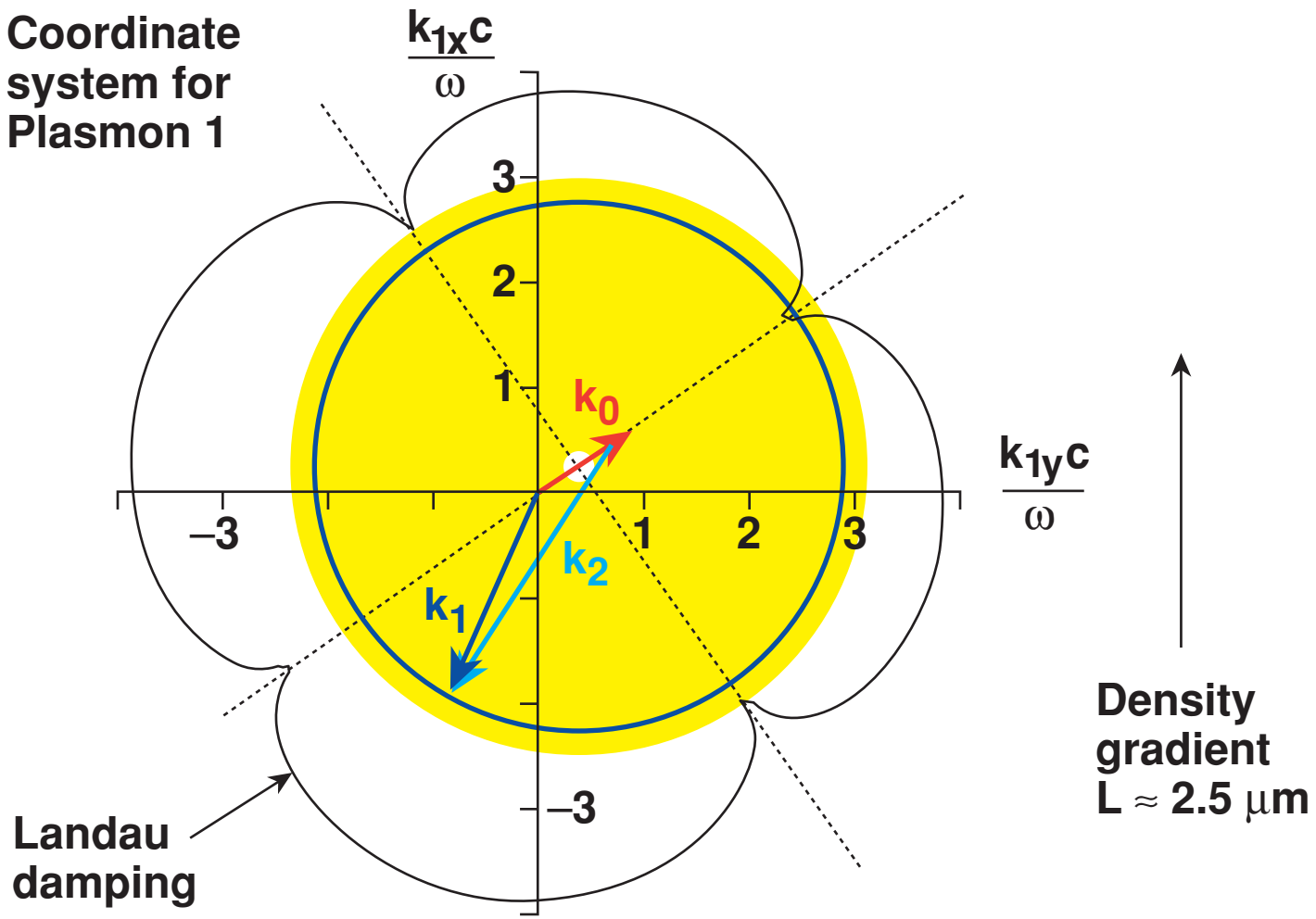
E12671

The angular distribution of the reflected fundamental is solely determined by the focusing optics



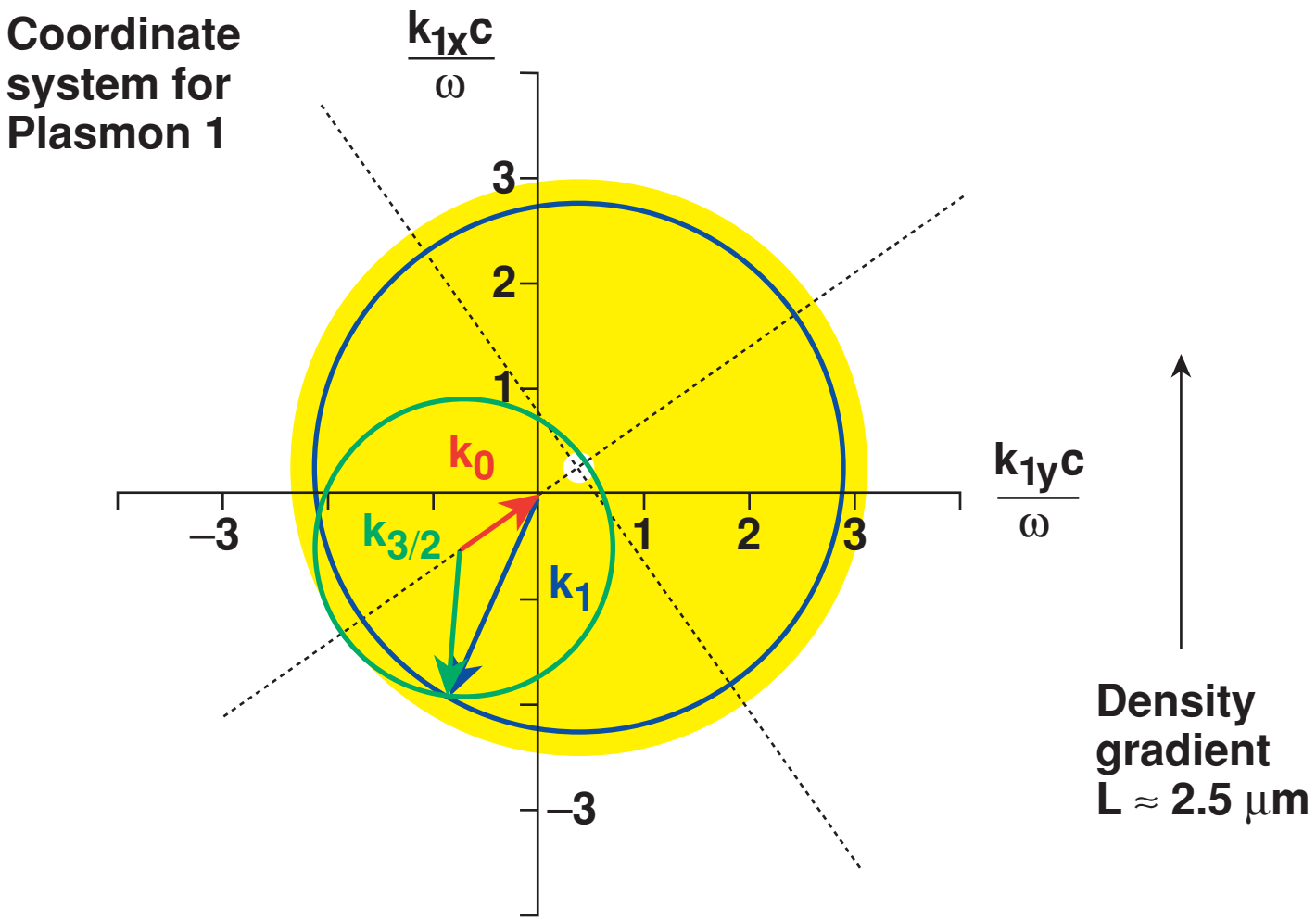
E12672

The k-space analysis of the TPD process reveals that the tip of the wave vector lies on a circle



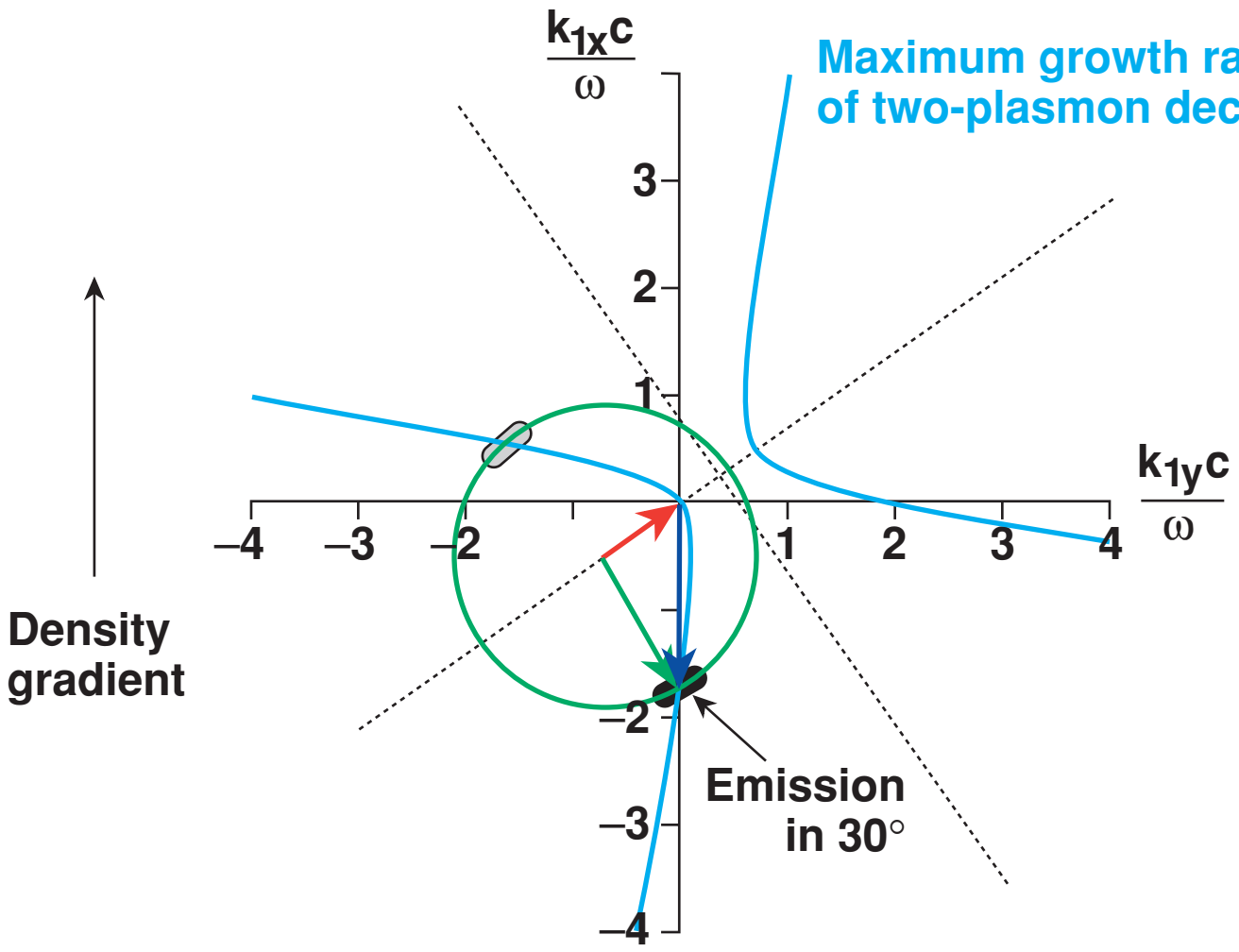
E12673

The intersections of TPD circle and radiation circle set the emission directions for the 3ω/2



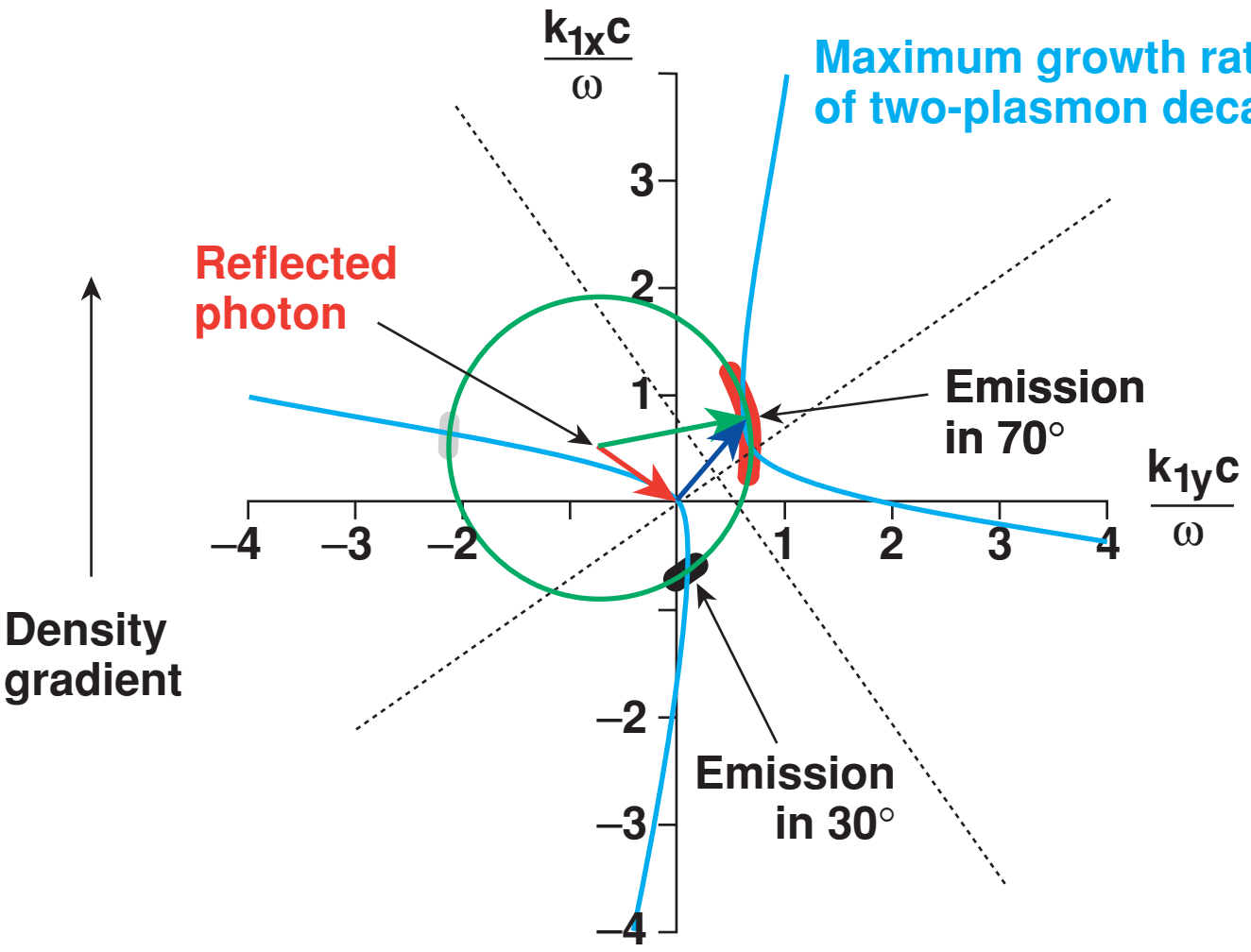
E12674

Maximum growth rate determines the emission directions of the 3ω/2-harmonics



E12675

Laser photons reflected from the plasma contribute to the 3ω/2-harmonic generation



E12676

Summary/Conclusions

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- **Detailed measurements of the angular distribution of the $3\omega/2$-harmonic radiation in short-scale-length ($L/\lambda = 3$), femtosecond-laser-produced plasmas have been made.**
- **A characteristic double-peak structure at ~ 25° and 70° with respect to the surface normal has been measured in the reflection direction.**
- **A good agreement is found with theoretical predictions based on the two-plasmon-decay instability within the framework of linear theory.**