Fully analytic spaser model:
Understanding threshold limitations

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We present a completely analytic model to describe spherical core-shell surface plasmon lasers (spasers). Our model drops the widely used quasistatic semi-quantum mechanical description in favour of fully vectorial Mie theory. This allows for precise incorporation of realistic gain relaxation rates that have been massively underestimated so far. Only this enables understanding of limiting dynamics that hinder efficient spaser devices up to now. Our model clearly demonstrates the dramatic beneficial impact of emitter-free spacing layers between gain and metal on the spaser threshold.