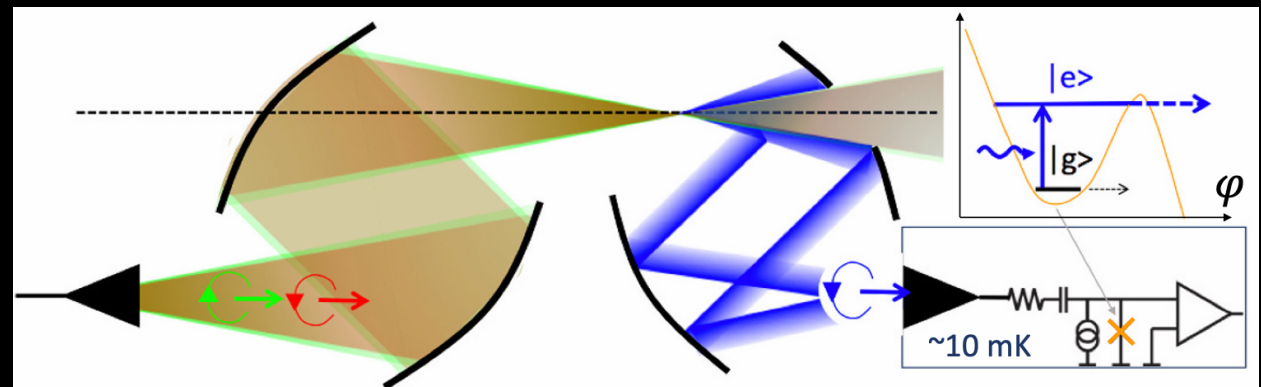


Stimulated radar collider for probing gravitationally weak coupling pseudo Nambu-Goldstone bosons

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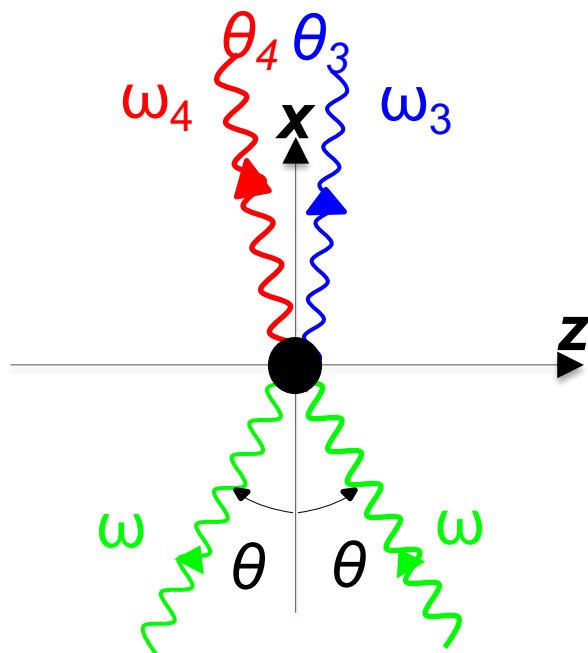
1. Direct pseudo Nambu-Goldstone boson production and its stimulated decay in photon-photon scattering
2. Expected sensitivity with a 100 J class GHz-band photon-photon collider (a focused radar system)
3. Summary

K.Homma, Y. Kirita, arXiv:1909.00983, JHEP 09 (2020) 095



Quasi-parallel photon-photon collision

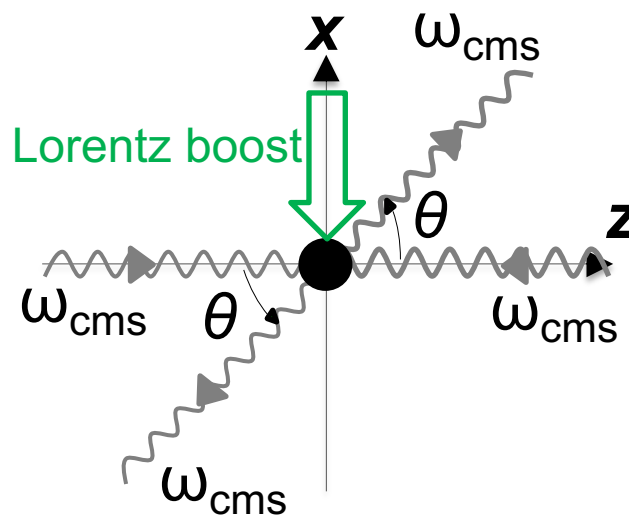
Quasi-Parallel collision System



$$E_{cms} = 2\omega \sin \theta$$

Low mass search

Center of Mass System



$$E_{cms} = 2\omega_{cms}$$

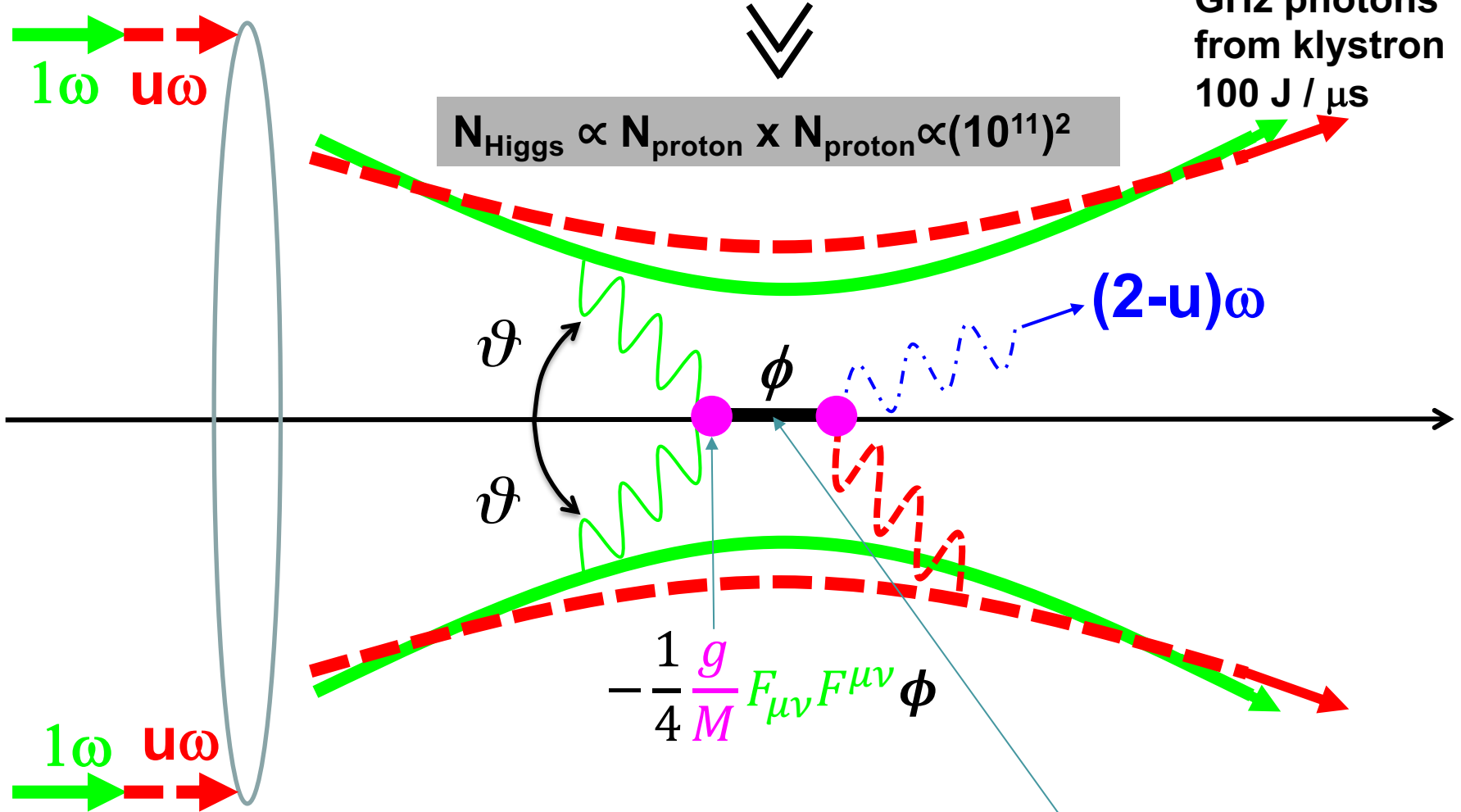
High mass search

Stimulated photon-photon collider concept

$$N_{\text{pNGB}} \propto N_{\text{creation}} \times N_{\text{creation}} \times N_{\text{induce}} \propto (10^{25})^3$$

GHz photons
from klystron
100 J / μs

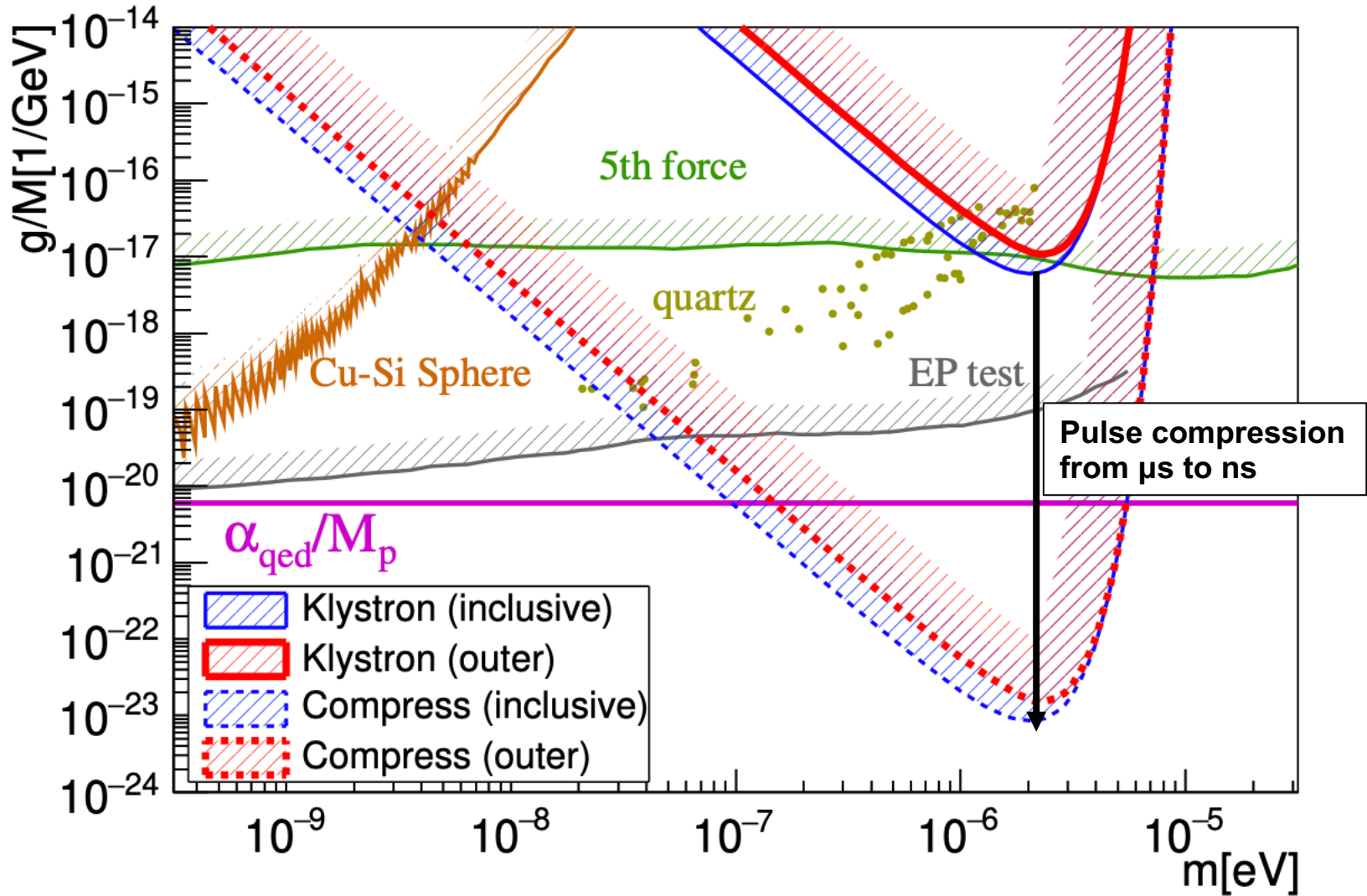
$$N_{\text{Higgs}} \propto N_{\text{proton}} \times N_{\text{proton}} \propto (10^{11})^2$$



s-channel propagator including
off-shell part for a pNGB (ϕ) exchange³

Can we reach gravitational coupling ?

K.Homma, Y. Kirita, arXiv:1909.00983, JHEP 09 (2020) 095



Summary

- We have a way to access gravitational coupling phenomena in stimulated photon-photon scattering process (a focused radar system) in laboratory experiments, if the two main technological issues are resolved:
 - GHz-band pulse compression down to Fourier transform limit,
 - GHz-band photo-counting with single photon resolution.