

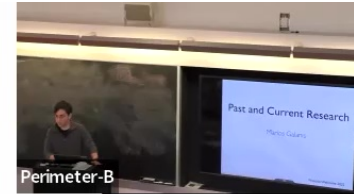
Title: Session 2 - Marios Galanis

Speakers: Marios Galanis

Collection: POSTDOC WELCOME 2022

Date: October 24, 2022 - 12:10 PM

URL: <https://pirsa.org/22100129>



# Past and Current Research

Marios Galanis

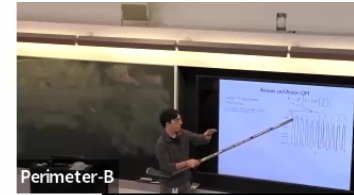
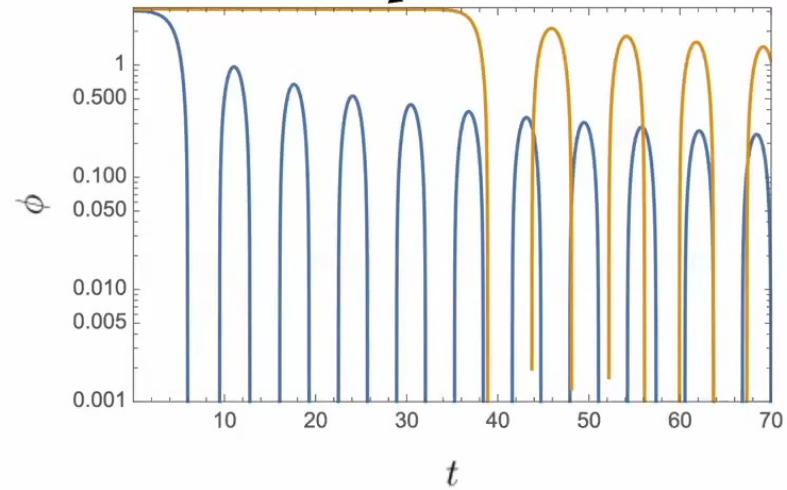
Postdoc Welcome 2022

# Axions and Axion DM

$$V \sim \Lambda^4 \left[ 1 - \cos \left( \frac{\phi}{f_a} \right) \right]$$

- Large Misalignment Mechanism

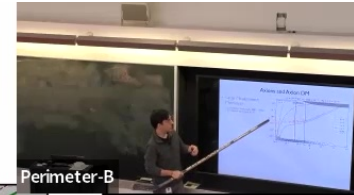
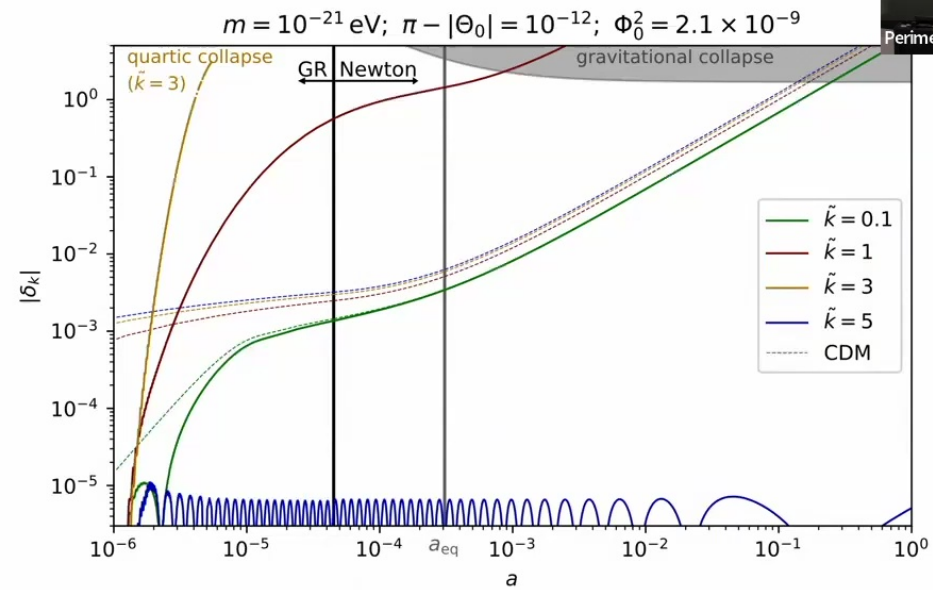
[A. Arvanitaki, S. Dimopoulos, **MG**, L. Lehner, J. Thompson, K. Van Tilburg, 2019]



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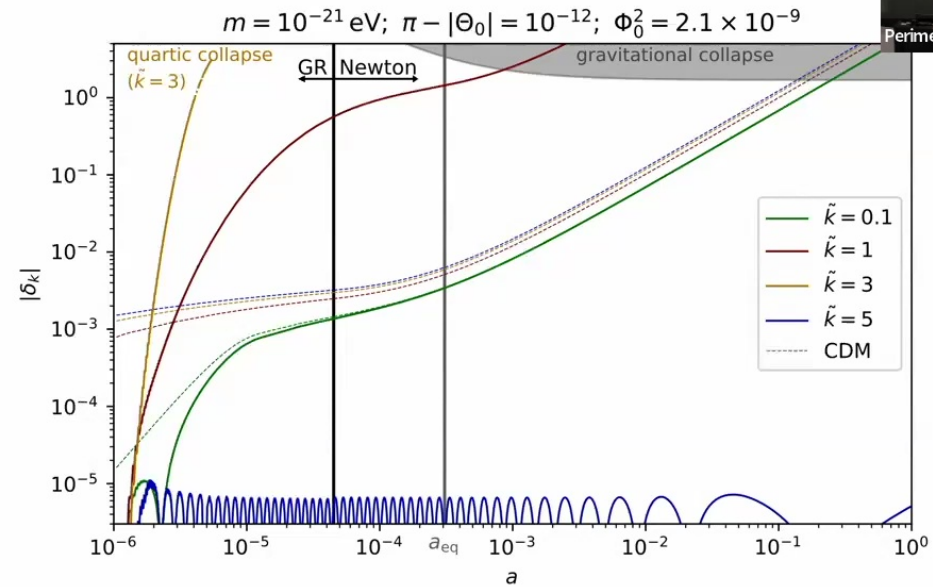
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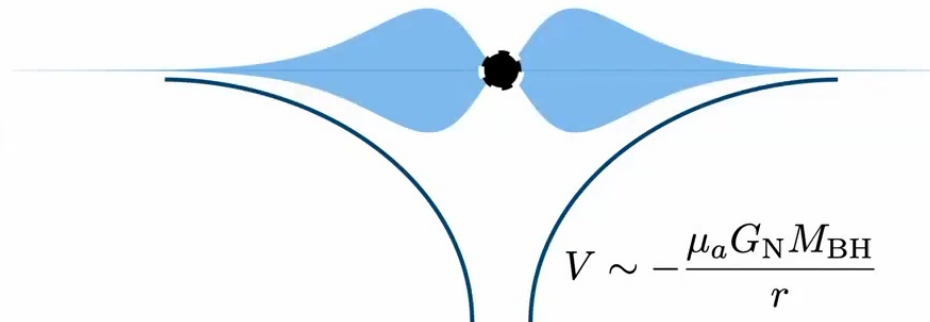
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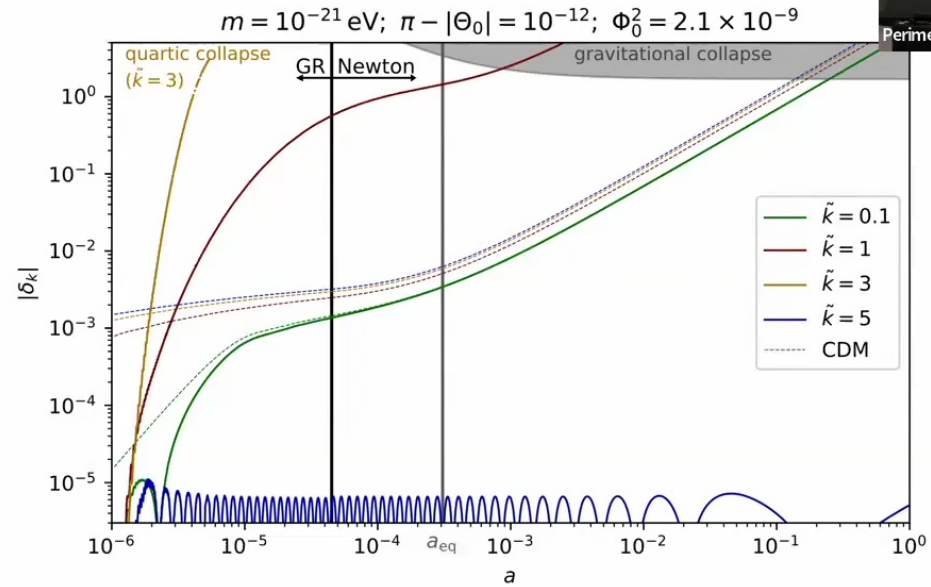
- Black Hole Superradiance



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[A. Arvanitaki, S. Dimopoulos, **MG**, L. Lehner, J. Thompson, K. Van Tilburg, 2019]

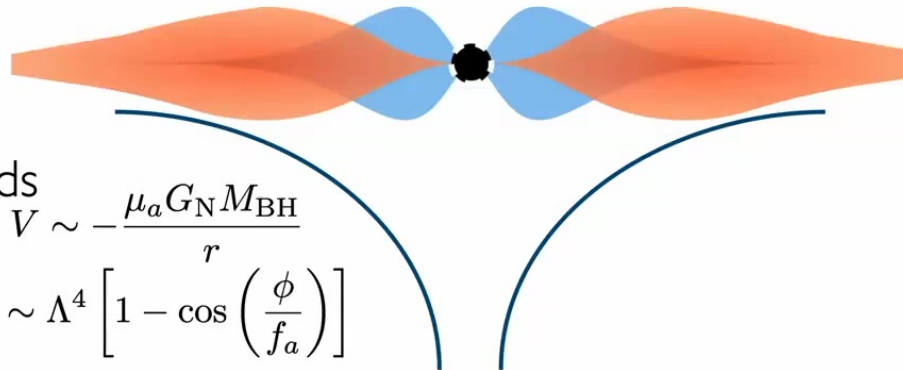


- Black Hole Superradiance of self-interacting scalar fields

[M. Baryakhtar, **MG**, R. Lasenby, O. Simon 2021]

$$V \sim -\frac{\mu_a G_N M_{\text{BH}}}{r}$$

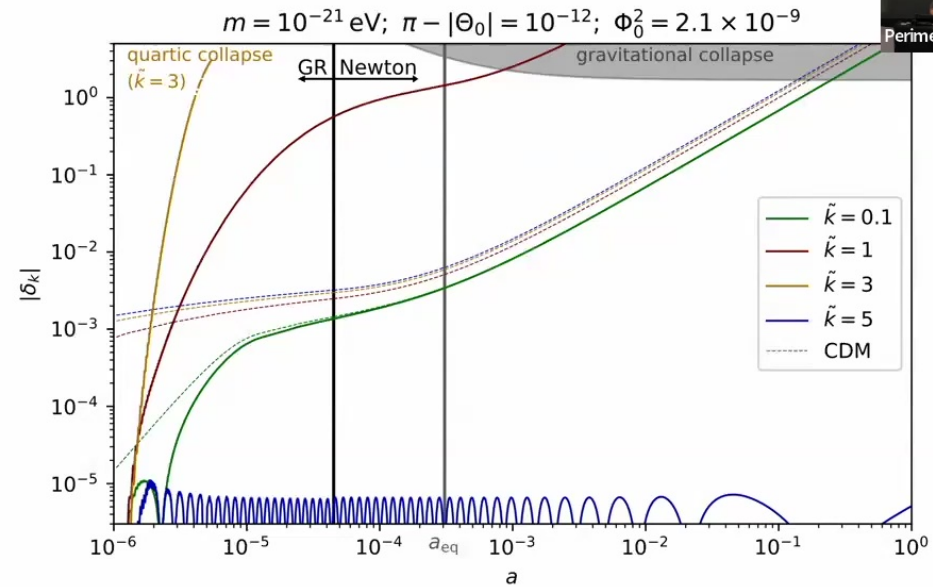
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# Axions and Axion DM

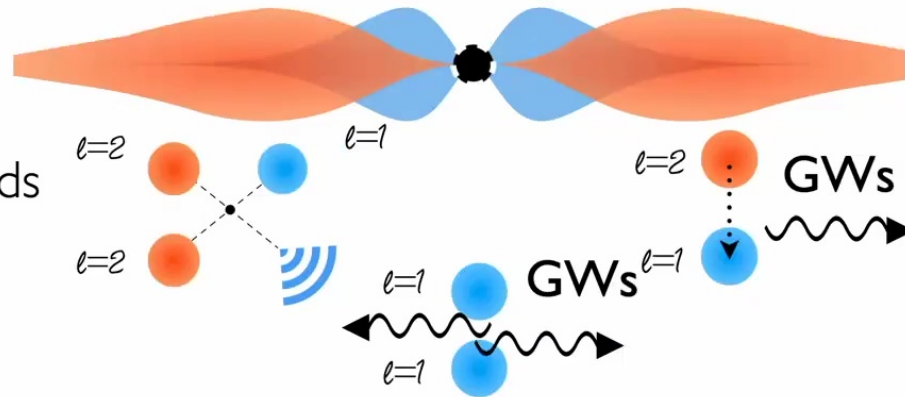
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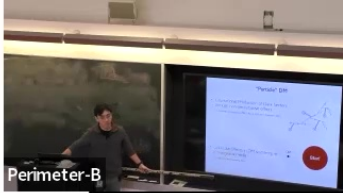
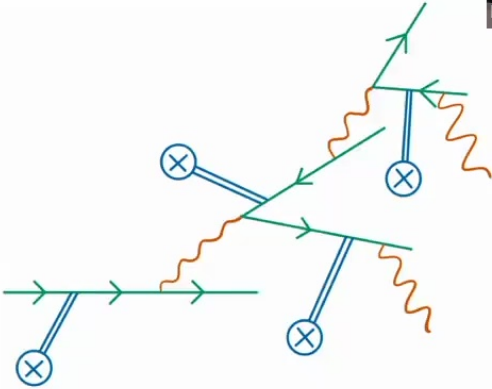
[M. Baryakhtar, **MG**, R. Lasenby, O. Simon 2021]



# “Particle” DM

- Gravitational Production of Dark Sectors through non-perturbative effects

[A. Arvanitaki, S. Dimopoulos, MG, D. Racco, O. Simon, J. Thompson, 2021]



- Collective Effects in DM scattering in astrophysical media

[W. DeRocco, MG, R. Lasenby, 2022]

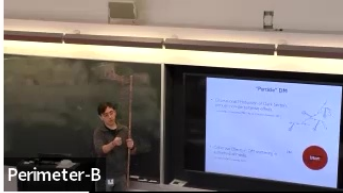
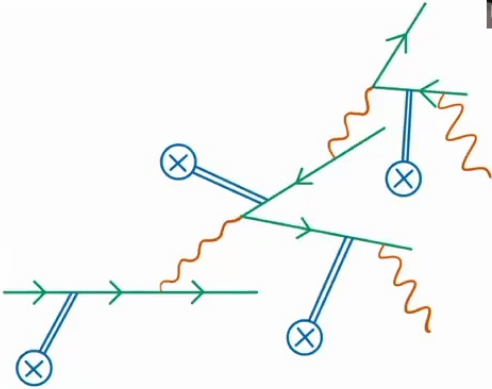




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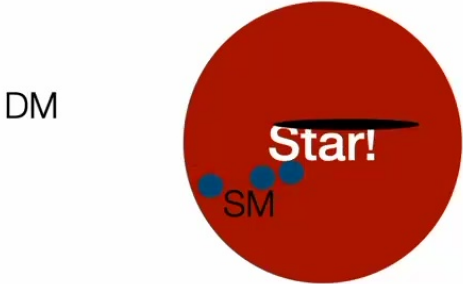
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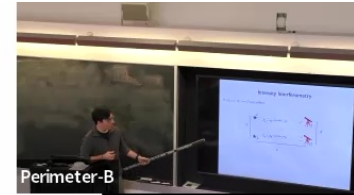
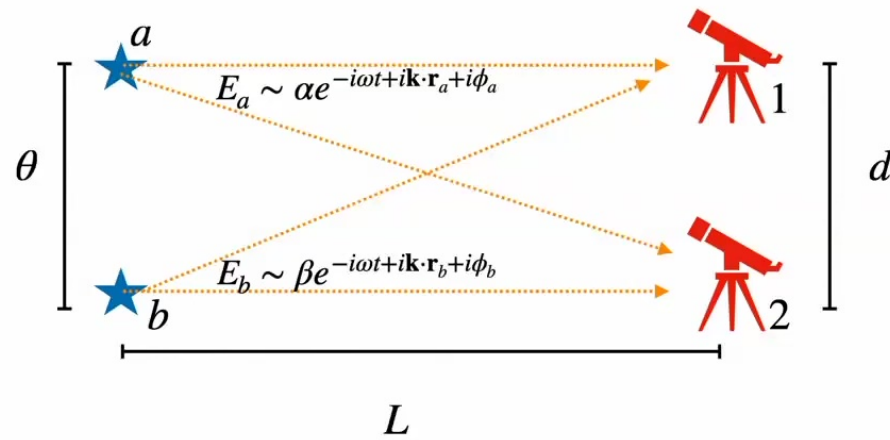
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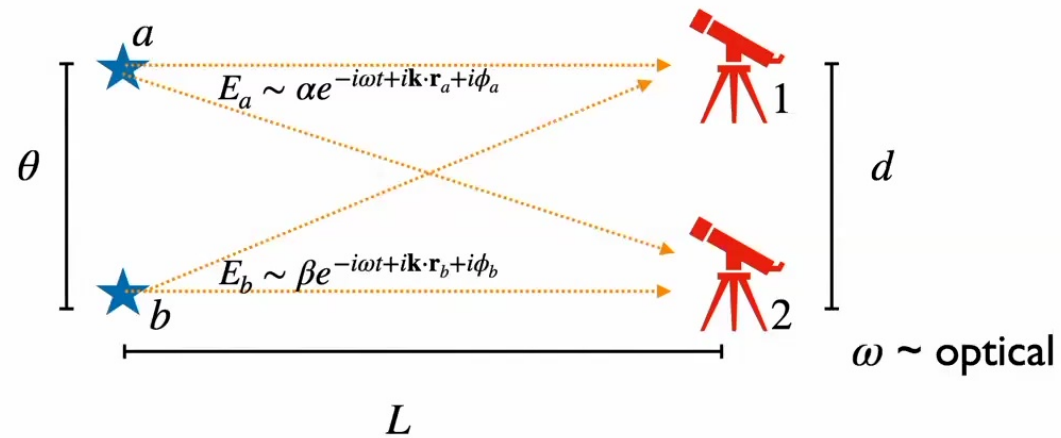
# Intensity Interferometry

Hanbury Brown-Twiss effect



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Hanbury Brown-Twiss effect



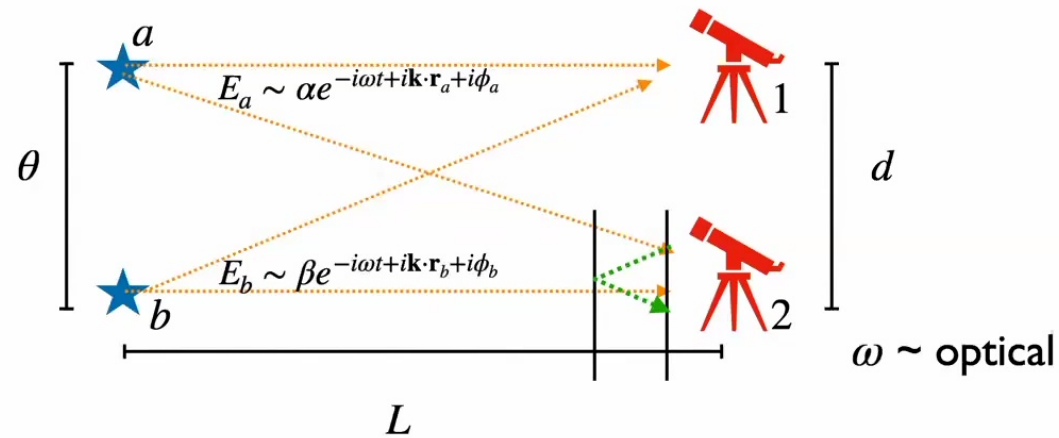
$$\langle I_1 \rangle \sim \langle I_2 \rangle \sim |\alpha|^2 + |\beta|^2$$

$$\theta, \sigma_\theta \simeq \frac{1}{kd} \sim \mu\text{arcsec, for } d \sim R_\oplus$$

$$\frac{\langle I_1 I_2 \rangle}{\langle I_1 \rangle \langle I_2 \rangle} \sim 1 + \frac{\tau_c}{\Delta t} e^{-(k\theta \cdot \mathbf{d})^2} \cos(k\theta \cdot \mathbf{d})$$

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Hanbury Brown-Twiss effect



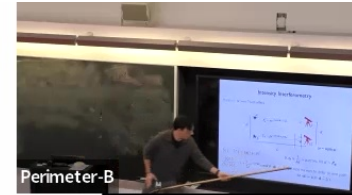
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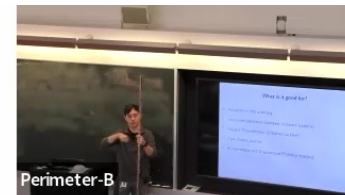
**Trick:** Add mirrors to delay to one path  
 $k\theta \cdot \mathbf{d} \rightarrow k(\theta \cdot \mathbf{d} - 2l)$

4



## What is it good for?

- Astrometric micro-lensing
- Exoplanet Detection (wobbles in binary systems)
- Parallax Measurement (Distance Ladder?)
- Dark Matter clumps
- Accelerations and Gravitational Potential mapping



## Excited About:

- BSM phenomenology in Astrophysics, Cosmology and Lab
- Anything potentially measurable!

