

Blocking superradiance with sub-luminal dispersion

Sam Patrick^{a*}, Silke Weinfurter^b

- Department of Physics and Astronomy, University of British Columbia, Vancouver, British Columbia, V6T 1Z1, Canada
- School of Mathematical Sciences, University of Nottingham, University Park, Nottingham, NG7 2RD, UK

* email : sampatrick31@googlemail.com

Superradiance involves the extraction of energy and angular momentum from a rotating system by amplification of incident radiation. This effect has been extensively studied for shallow water waves on a draining vortex, which is the analogue of a rotating black hole spacetime. However, experiments have shown that superradiance can also occur for deep water waves. In this short talk, I will discuss some aspects of deep water superradiance. In particular, the sub-luminal dispersion relation means that some superradiant modes are blocked from escaping the vortex and are instead reflected back in. This implies that, in certain parameter regimes, dispersion can prevent superradiant modes from extracting energy and angular momentum from the system.

[1] S. Patrick, S. Weinfurter, Phys. Rev. D. 102, 084041 (2020)

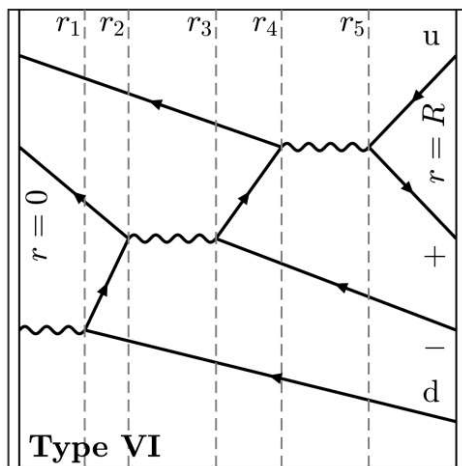


Figure 1 : Blocking of superradiant deep water waves around a draining vortex.