

I will start by motivating why some observational probes of astrophysical black holes in a quantum theory might be radically different from their classical ones. I will then show that these signatures can be best probed by searching for low frequency harmonics in the gravitational wave spectrum of perturbed black holes, what we call "quantum black hole seismology". Finally, I will end by summarizing the (controversial) observational status of these searches and their future outlook.