The discovery of gravitational waves has finally added a further confirmation of what was in Einstein's theory of relativity (https://www.nasa.gov/feature/goddard/2016/nsf-s-ligo-has-detected-gravitational-waves).

Very often, theories, or better the mathematical description of natural phenomena, require and/or stimulate experimental validations of the expected effects. Let's make the example of the well known Newton's law of gravity, that allows to predict the speed of a body in a vacuum falling from a certain height. In the case of relativity, a famous experiment to validate the theory was that the deflection of light by the mass, which required a simple experiment during a solar eclipse a few years apart. Sometimes, the difficulties in the validation of a theory is to identify a measurable effect accurately. And this is the case of gravitational waves: without entering many details, each mass displacement (not spherically symmetric) causes a disturbance in the gravitational field and the generation of a wave. In order to measure this wave with current technologies, huge mass movements are needed, such as those that occur in stars, and so very far apart. But continuosly, the matter around us changes its spatial distribution, and in principle this generates gravitational waves, that it is impossible to detect with the instruments we can use so far.

Gravitational waves were also "translated" into sound waves, since a perturbation of the space-time geometry introduced by the wave causes a displacement of the masses too (https://www.ligo.caltech.edu/video/ligo20160211v2). When in fact we face a compression and a rarefaction of the air, a so-called pressure wave, we hear the sound wave caused by the displacement of the masses of the particles of air impacting our ear. In the vacuum, no mass would interact and then the sounds cannot be heard. The gravitational wave is instead a sound wave that propagates also through a zero-mass medium.

At my knowledge, no one has dealt with the effects derived by a sound wave generating a gravitational wave. Or rather, I believe no one has worried about this because at the moment it is impossible to even imagine how we can detect gravitational waves generated by our daylife pressure waves. Let's suppose instead that there is an interaction, unknown to us in the laws, between gravitational waves even at very low intensity, such as for example generated by a piano playing "The Moonlight" by Debussy (https://www.youtube. com / watch? v = tZv_GXyGrHA).

Suppose that the laws and formalism adopted by harmony (in music) go beyond those of acoustic, but also involve aspects dealing with gravitational waves. Namely, let's speculate that the consonance and dissonance described in music are related to some laws of gravitational interaction, such as the resonance and interference have been at the basis of phenomena described by classical equations or quantum mechanics. And moreover, let's speculate that these unknown laws can bind those aspects as the synchronicity described by Jung, or functionality and beauty.

The Moonlight of Debussy generates a sound wave, and a gravitational wave, but undoubtedly generates emotions when interacting with our body through a complex system of cells that vibrate asymmetrically and that are in principle sensors, both of sound and gravitational waves. Gravity is still the only fundamental force missing to be unified with the others, and the only one producing only

attraction...maybe a bridge between musical harmony and the theory of relativity could allow understanding those phenomena of attraction and even repulsion which at the moment we call mystery, fascination, hate...

21 February 2017

Pier Francesco Moretti