

# Inter-substances “Natural Quantum Communication” investigation by atomic exchange observation with photonic wave-particle duality quantisation

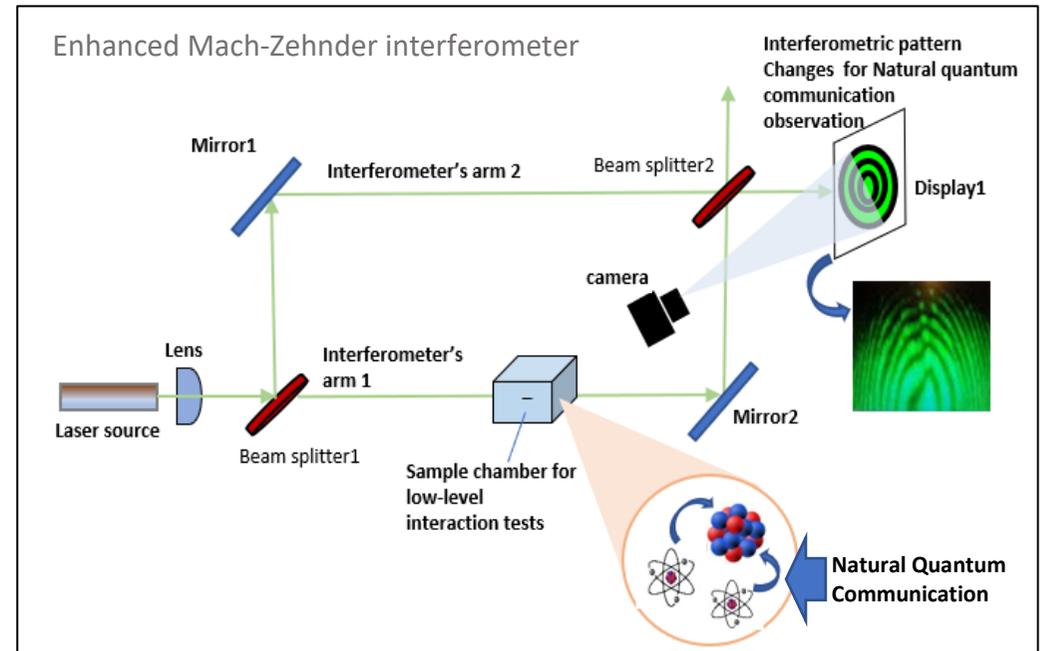
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## Summary

We have managed to observe the magnitudes of atomic exchange [3] activities between the chemical substances by quantization of interferometric (Mach-Zehnder) quantum eraser pattern's motions caused by photonic *wave-particle* duality shifting [1]. Such characteristic shiftings substantially support our Natural Quantum Communication theory which indicates that the Interferometer's photons attempt to access or gain complementary information provided by “naturally communicated” substances in the chemical reaction tube located along the lower arm of interferometer, which consequently exhibit characteristic *wave-particle* duality shifting [2]. The proposed theory may explain, how medications provide curing effect on "diseased organic tissues" via transmitting a complementary quantum information that is normally missing in the receiver domains, or natural quantum communication between vaccine and immune system. Furthermore, in the future some related advance technique would be expected to replace natural substance style supplements (e.g. human cells' need of Oxygen) with only (Oxygen atom's) quantum information provision instead.

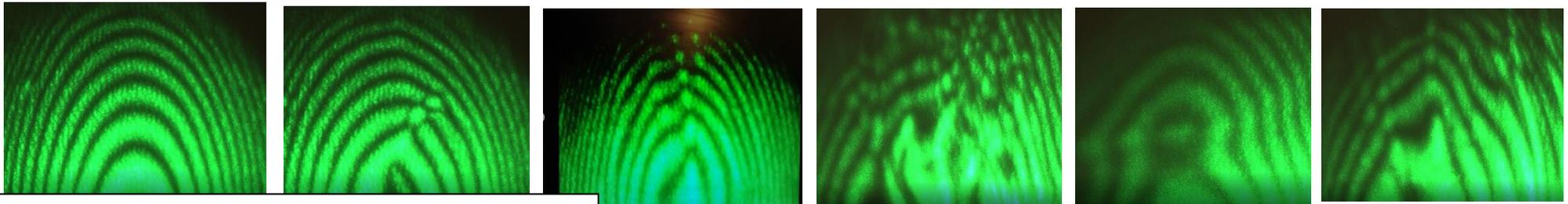
## Experimental setup



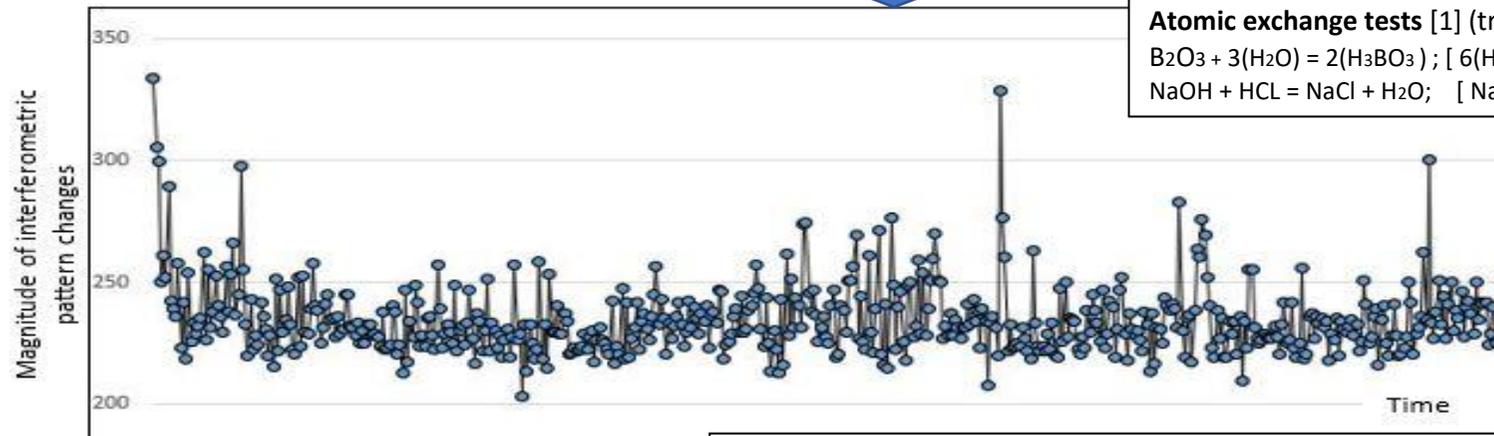
Modified Mach-Zehnder interferometer

## References :

- [1] Orun, A. and G. Smith, (2020). "Investigation on a quantum communication phenomenon between subatomic properties of substances by quantum eraser pattern quantification," *Optical Engineering*. 59(3),
- [2] Qureshi, T. and M. A. Siddiqui, "Wave-particle duality in N-path interference," *Ann. Phys.* 385(2017), 598–604 (2017).
- [3] R. M. Handler et al., "Atom exchange between aqueous Fe(11) and goethite: an Fe isotope tracer study," *Environ. Sci. Technol.* 43, 1102–1107 (2009).



Pattern changes with wave-particle duality shiftings exhibiting the photons' access attempts to dynamic information via reactions in test tube located on the interferometers lower arm



**Atomic exchange tests [1]** (transmitter and receiver substances)  
 $B_2O_3 + 3(H_2O) = 2(H_3BO_3)$  ; [ 6(H), 3(O) => 9 atom exchange reaction ]  
 $NaOH + HCL = NaCl + H_2O$  ; [ Na, Cl => 2 atom exchange reaction ]

Magnitudes of interferometric pattern changes exhibit their corresponding same level of Atomic (information) exchange between two domains (transmitter and receiver) which had already been proven by our work [1]. According to our theory, these two domains communicate at low-level which is called "Natural Quantum Communication"

### CONCLUSION

The Natural Quantum Communication theory has been inspired by our macro-scale daily life communication phenomenon where we transmit, receive or exchange quantum particles (e.g. electrons, photons, atoms, etc.) for our information exchange which is called "communication". But when same action is made by two chemical substances, we do not call it communication, we rather call it a new product! Such communication can also be made between two domains like human cell and substance's atoms, etc. The "information" is a key concept in quantum physics as quantum particles like photons, electrons, atoms or molecules always try to reach their "missing" quantum information by any supplier domain. The chain of attempts to access such complementary information change the states of quantum particles (photons in our case) which is reflected as wave-particle duality shiftings. Our novel technique may have several application areas in life sciences like pharmacology, biophysics, virology, etc. to develop new generation medications or vaccines, for communication decoding between the microorganisms, cells or viruses, etc.