

# Foreword

This article is designed to describe (but *not* explain) the mysteries of Quantum Physics to the interested lay person. I assume that the reader has studied and absorbed Physics and Mathematics at normal High School level, but not at any further level. I have attempted not to assume any Physics or Mathematics beyond this, without explaining it.

I have not shied away from using Mathematics. Physics is a quantitative subject and relies heavily on formulae to describe or predict the quantitative results of experiments. To quote Richard Feynman [1] - “If you want to learn about Nature, to appreciate Nature, it is necessary to understand the language that she speaks in.”

Once again, no Mathematics is assumed beyond that normally studied in High School, but it is expected that the reader will be comfortable with the manipulation of symbols in simple algebraic equations and the application of some elementary trigonometry. The reader who finds this too challenging should nevertheless be able to follow the general gist of the article - by taking the results quoted as correct and not being overly exercised by his (her) inability to comprehend the detail.

Physics is a progressive subject and it is impossible to learn about Quantum Physics without a good grounding in classical physics, i.e. the physics that was understood by the end of the nineteenth century, before the discovery of Quantum Theory. Quantum Theory essentially deals with the fact that everything which can transmit energy behaves *both* as a particle and as a wave. This article therefore contains an introduction to some of the important properties of both waves and particles, which are necessarily used in the description of Quantum Physics.

I have included a glossary of technical terms. I hope the reader will find it useful to be able to refer to this whenever (s)he comes across a technical term which (s)he does not understand. The terms defined in the glossary appear in **bold-face** the first time they are used in the body of the text.

I have also added an appendix of all the relevant mathematical formulae and equations. **Do NOT read this appendix** unless you have studied mathematics up to first year University level. It is included for completeness. If you feel that you would nevertheless like to see a set of formulae which you will not understand and are confident that this will not put you off or cause confusion, then take a look, but note that it is *not necessary* to read these equations in order to be able to follow this article.

The article is quite long and has to be read slowly and carefully. I felt that as far as possible I should not skip steps and ask the reader to accept results quoted without any form of justification. It is also repetitive in parts “*repetito mater studiorum est.*”<sup>†</sup>

I very much hope the reader gleans from this article some flavour of what must be described as the most intriguing and enigmatic development in all of Natural Science.

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<sup>†</sup>repetition is the mother of all learning.