

# Appendix C

## Naming of the muon

Historically the muon has also gone by the name “mesotron” and “mu-meson”. The occurrence of the various names in abstracts of the American Physics Society journals is shown in Fig. C.1. The history of the particle’s name has involved several Nobel prize winning Physicists, and will now be summarised using first hand evidence wherever possible.

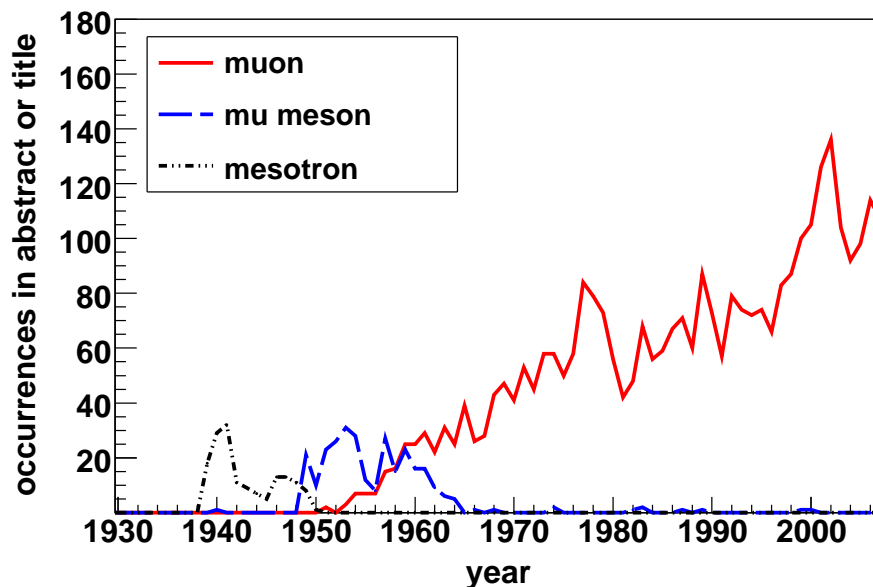


Figure C.1: The figure shows the number of American Physical Society abstracts in a particular year that used either “muon”, “mu-meson” or “mesotron”. The figure was produced by the author of this thesis using the APS Physics journal online search.

The initial name suggested by N. Bohr<sup>63</sup> was “yucon”[113], since it was initially believed to be the strong force particle predicted by Yukawa in 1935. The name “mesotron” was first suggested in a 1938 Nature article by C.D. Anderson and S.H. Neddermeyer[114]. Prior to this article, the particle was known by a variety of names such as “Yukon for Yukawa ... X-particle

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<sup>63</sup>N. Bohr was awarded the 1922 Nobel Prize for Physics “for his services in the investigation of the structure of atoms and of the radiation emanating from them”.

... heavy electron ... baryon”[115], and additionally “dynatron, penetron, barytron”[114]. The Nature article itself has a colourful history, revealed in a 1979 interview[115] with C. Anderson:

“So Seth and I – Millikan was away – wrote a little note, one paragraph, to Nature suggesting that the name of it be mesoton – “meso” meaning intermediate, like mezzanine in a building ... When Millikan<sup>64</sup> came back, I told him about this and showed him the letter, and he hit the ceiling. He said “That’s not a good word. It should be mesotron. There should be an “r” in there.” And he said, “Look, there’s electron, there’s a neutron. And I said, “There’s proton.” Well, the end and issue of it was that Seth and I cabled that “r” to Nature, and it came out mesotron, a word which I didn’t like – nobody liked it”

The Nature article argues that “it does appear quite certain that the mass, whether unique or not, is greater than that of an electron and less than that of a proton”, and hence the particle was given a name indicating its mass was inbetween the two well established particles. Amusingly, the Nature articles finishes with, “It appears quite likely that the appropriateness of this name will not be lost, whatever new facts concerning these particles may be learned in the future”.

A month later, R.A. Millikan wrote a short note in Physical Review, where he quotes a letter from Bohr:

“I take pleasure in telling you that every one at a small conference on cosmic-ray problems, including Auger, Blackett, Fermi<sup>65</sup>, Heisenberg<sup>66</sup>, and Rossi ... was in complete agreement with Anderson’s proposal of the name ‘mesotron’ for the penetrating cosmic-ray particles.”

C. Anderson’s Nature article and R. Millikan’s Physical Review article apparently failed to win popular consensus, as made apparent in a foreward by A.H. Compton<sup>67</sup> for a 1939 “Symposium on Cosmic Rays”[116]:

“An editorial problem has arisen with regard to the designation of the particle of mass intermediate between the electron and the proton ... A vote indicated

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<sup>64</sup>C. Anderson was supervised by R.A. Millikan, who was awarded the 1923 Nobel Prize for Physics for his measurement of the electron’s charge.

<sup>65</sup>E. Fermi was awarded the 1938 Nobel Prize in Physics for “his demonstrations of the existence of new radioactive elements by neutron irradiation, and for his related discovery of nuclear reactions brought about by slow neutrinos”.

<sup>66</sup>W.K. Heisenberg was awarded the 1932 Nobel Prize in Physics for “the creation of quantum mechanics”.

<sup>67</sup>A.H. Compton was awarded the 1927 Nobel Prize in Physics for his work on the change in X-ray wavelengths upon scattering.

about equal choice between *meson* and *mesotron* with no considerable support for *mesoton*, *barytron*, *yukon* or *heavy electron*. Except where the authors have indicated a distinct preference to the contrary, we have chosen to use the term *mesotron*.”

The transition from “mesotron” to “meson” appears to have been initiated by a footnote in a 1939 Nature article[117] by H.J. Bhabha:

“It is felt that the ‘tr’ in this word is redundant, since it does not belong to the Greek root ‘meso’ for middle; the ‘tr’ in neutron and electron belong, of course, to the roots “neutr” and “electra” ... It would therefore be more logical and also shorter to call the new particle a meson instead of a mesotron.”

C. Anderson described other objections to the term “mesotron”, since “tron” is usually reserved for instruments, such as “audiotron or cyclotron or synchrotron”[115].

The pion was discovered in 1947 by C.F. Powell. According to Ref. [106], Powell named the new heavier particles “pi-mesons” and the older particles “mu-mesons”. Additionally, C. Anderson credits Powell with the use of greek letters: “And (Powell) used, I guess for his own bookkeeping, Greek letters – pi and mu”. Lee[57] suggests that Powell “introduced the symbol  $\pi$  which stands for ‘primary’”, but credits Fermi as being the first to use the symbol  $\mu$ .