

# Epilogue to the discovery of a particle similar to the Higgs boson: August 2012<sup>†</sup>

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## 1. Madison 1980—Bonn 1981

The 20th International Conference on High Energy Physics was held in Madison (USA) in 1980; I was invited to present the concluding talk, but was not able to take part in the conference, having been excluded from the Soviet delegation the day before it flew from Moscow. In May 1981, an expanded text of this talk was published in *Physics–Uspekhi* [1]. The following words appeared in the section titled ‘Scalars’: “The experimental search for scalar particles is a primary task.”

In August 1981, at the 10th International Symposium on the Interaction of Leptons and Photons at High Energies, held in Bonn, I presented the concluding talk, in which I proposed searching for the higgs as problem No. 1 for high energy physics [2]. In connection with the discovery of the higgs in 2012, the *UFN* editorial board decided to publish the Russian translation of this talk [3] (not published previously in Russian) and proposed that I write comments on it.

## 2. CERN 1984

In 1984, the decision was made to construct the Large Hadron Collider<sup>1</sup> [4].

## 3. Mumbai 2011

In his concluding report at the regular conference on the interaction of leptons and photons at high energies held in Mumbai in 2011, M Peskin [6] quoted the words from my concluding talk at the Bonn conference of 1981, that the discovery of the higgs is problem No. 1 for physics.

## 4. *ABC of physics*, 2012

My book, *ABC of Physics: a Very Brief Guide* [7], was published in 2012 both in Russian and in English. In this book, I tried to convince professional physicists that relativity theory and quantum mechanics can be explained to school

<sup>1</sup> The term ‘hadron’ was introduced at the 11th International Conference of High Energy Physics held in 1962 at CERN [5].

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children applying only school-level mathematics. Thus, for example, I described the spectrum of all known fundamental particles starting from the graviton of spin two up to the ‘higgs’ of spin zero.

## 5. Comment on the term ‘higgs’

I don’t consider the widespread name ‘Higgs boson’ quite appropriate, since no other particle is called by a name involving two words, of which the additional terms ‘boson’ and ‘fermion’ originate from the surnames of Bose and Fermi. On the other hand, the name ‘higgson’ sounds too much like Higgs’s son in English. For many years, I have already been using the short term ‘higgs’, which, like the names of other particles, starts with a lower-case letter. I have also applied it in the *ABC of Physics*.

## 6. Other comments

The first thing that becomes evident from reading the Bonn talk is the extent to which I underestimated the scale of the task to be fulfilled. At the time, I considered it possible to see scalar particles, even in the colliders of 30 years ago, that were substantially inferior to the Large Hadron Collider in energy. The terminology applied in the talk also underwent certain changes: thus, the terms ‘quarkino’ and ‘leptino’ are no longer used, and they are substituted by ‘squarks’ and ‘sleptons’, respectively. What is more important is that no ‘supersymmetric twin’ of any ordinary particle has been found yet: there turned out to be no ‘superzoo round the corner’. Our knowledge of the masses and oscillations of neutrinos has expanded radically. The knowledge of the violation of CP-invariance has also expanded significantly. The most important discoveries have been made in cosmology. All this must be borne in mind when reading the 1981 talk.

## 7. Results of hunting for the higgs, 2012

When this note was finished, a conference, ‘Hunting for the higgs, 2012’, was held in France, and the results were summed up by M Peskin [8]. He also outlined the issues still remaining unresolved.

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<sup>†</sup> The editorial board of *Uspekhi Fizicheskikh Nauk* proposed that I write the present note, which contains brief clarifying comments on the text of my 1981 talk in Bonn and on how this talk is perceived today.

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