

Text of the thumbnail sketch.

Ludwig Faddeev (1934). This Russian mathematician (Steklov Mathematical Institute, St Petersburg), is one of the very few mathematicians that contributed to the investigations of gauge theories. In 1962 Feynman initiated such an investigation trying to find out the Feynman rules for such a theory. The Feynman rules are the precise prescriptions concerning the mathematical expressions corresponding to the diagrams. Feynman reported at some conference in Poland, never wrote it down himself, but the Poles made a transcript of his lecture. He introduced ghost particles, which are particles that occur in the Feynman rules and are essential to the mathematical prescriptions, but do not correspond to physical particles. He did that up to a point, using his own path-integral formalism, but got stuck at some level. Faddeev (together with V.N. Popov), using the same path-integral formalism, published a beautiful method to derive these Feynman rules for gauge theories in full generality. Since then the ghost particles are called Faddeev-Popov ghosts. You could say that Faddeev and Popov did beat Feynman at his own game.

Faddeev was already quite famous before that. He derived equations concerning the three-body problem that have been used heavily in nuclear physics.

As it happened I was editor of Physics Letters, a scientific journal to which Faddeev and Popov submitted their publication. At the time I did not know about path integrals, and I did not understand the article in any detail. Also I did not know then that gauge theories were important for understanding weak interactions. Nonetheless, I somehow felt that this work was important, and I accepted it (thank God). Here you see something quite important: new work is often difficult to recognize, and an editor must have a nose for those things.