

Jocular Physics: A Tribute to Bohr in Humor

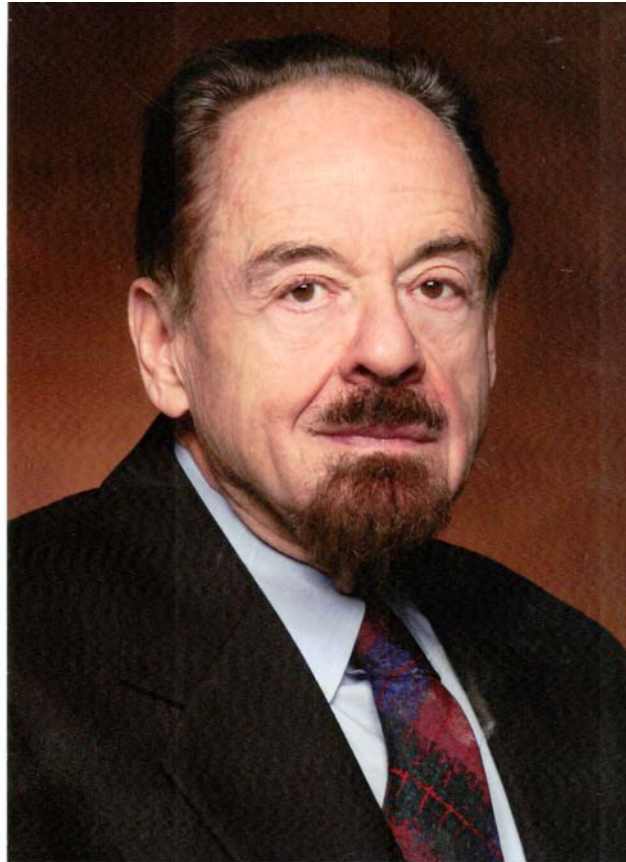
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Abstract

Copenhagen, starting in the 1920s and 1930s and continuing after the Second World War, was not just a center for extraordinary developments in quantum and nuclear physics; it also provided a perfect stage for physicists' abundant humor. We will examine the *Journal of Jocular Physics*, a humorous tribute to Bohr published on the occasions of his 50th, 60th and 70th birthdays. We will discuss how the articles in the journal reflected attempts by the contributors, such as Léon Rosenfeld, Victor Weisskopf and others, to interpret and explain aspects of Bohr's philosophy, such as complementarity and the abandonment of pure Laplacian determinism.

This talk (its title loosely translated in German to ‘lustige Physik’) is dedicated to the memory of the inspiring physicist and historian of physics Harry Lustig



Journal of Jocular Physics

- Tribute to Bohr on his 50th, 60th and 70th birthdays (October 7 -- 1935, 1945, 1955)
- Alternative to “Festschrift:” otherwise Bohr would “feel it as his duty to read the contents and even try to learn something.”
- Written by those who had research visits or associations with the Institute of Theoretical Physics (now Niels Bohr Institute)
- Reprinted by Niels Bohr Archive during Bohr’s centenary in 1985 along with the much more widely-known Copenhagen Faust
- Shares much with CF in terms of rich veins of cynical humor

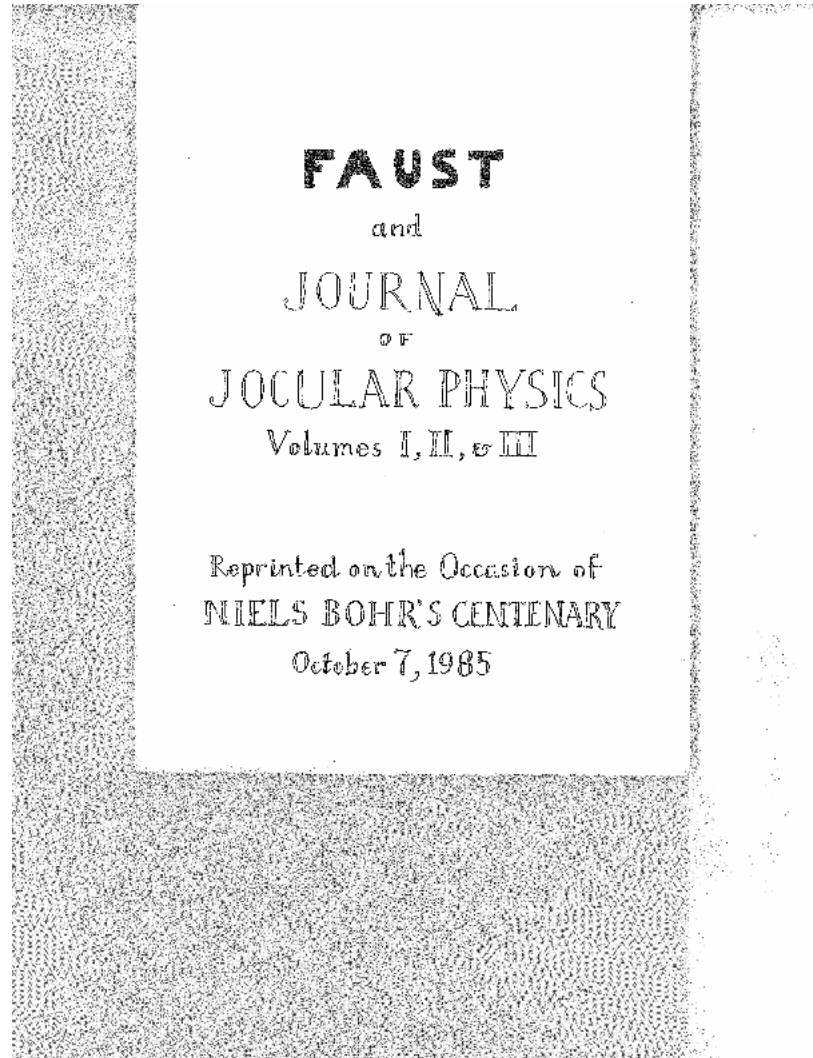


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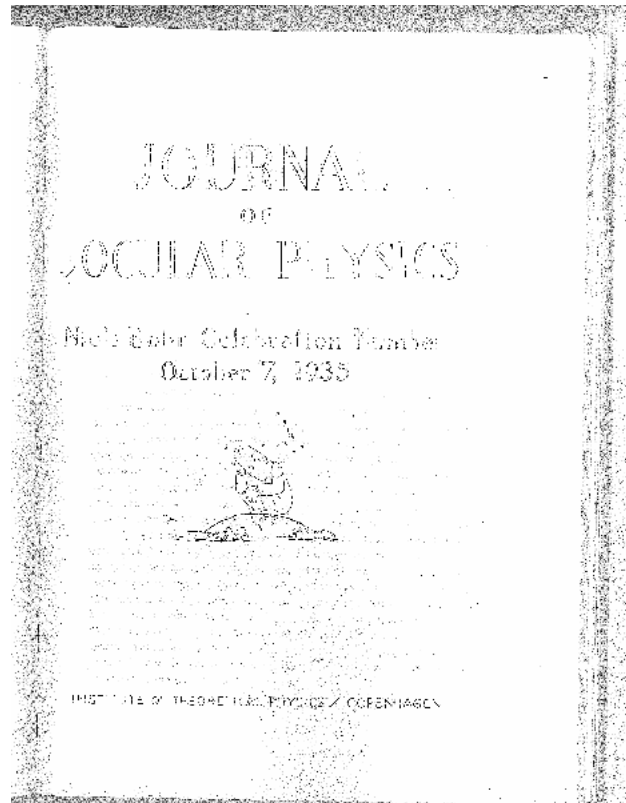
Gamow's description of humorous plays that proceeded and inspired the journal:

“It became customary at the end of each spring conference at Blegdamsvej 15 (the street address of Bohr's Institute of Theoretical Physics) to produce a stunt pertaining to recent developments in physics.” (Gamow, *Thirty Years that Shook Physics*, p. 167).

Cover of the reprint version of the Journal of Jocular Physics



Cover of Journal of Jocular Physics, Volume I, October 7, 1935
(Caricature of Bohr kneeling on the Earth, right hand on forehead,
& pondering deep thoughts, like Rodin's "The Thinker")



First piece: “Niels Bohr on His Fiftieth Birthday” by Kanetaka Ariyama. Sentimental ode to Bohr’s excellent teaching. Discusses progress in physics, including particles known and speculated about at the time: neutron, neutrino, positron. Written in Japanese - translated into German



Role of neutrino plays a central, humorous role throughout series

- Prominent role in Copenhagen Faust
- Association with Pauli, a much-satirized (and admired) physicist
- “La Plainte du Neutrino” (The neutrino’s complaint) - a parody of “Un secret” by Felix Arvers that compares the neutrino’s elusiveness to a secret unrequited love.

Languages used in the first volume

- German - 6 papers
- Japanese, translated into German - 1 paper
- Danish - 2 papers
- French - 1 paper
- English - 1 paper

(By the third volume, this would shift almost completely to English)

Who were the contributors to the first volume?

- Most active contributor to the first volume - Victor Weisskopf
- 2 papers, both in German (one single-author; the other with Felix Bloch)
- Others included Otto Frisch, Hans Bethe, Edward Teller, Hendrik Casimir & Léon Rosenfeld
- Rosenfeld was the only physicist to contribute to all 3 volumes



Weisskopf: “Komplementäre Philosophie des Witzes” (Complementary Philosophy of Jokes)

- Truth is difficult to find
- However, through a kind of complementarity, jokes hold a kind of curved mirror to truth
- The result is a distorted view of truth that is nevertheless illuminating

Enigmatic aspect of complementarity

- Of the key tenets of quantum mechanics, complementarity is perhaps the most abstract and perplexing
- One common source of humor is a juxtaposition of opposites--the absurd aspects of contradictions
- Along with the uncertainty principle, shatters the staid predictability of simple determinism, where all properties of a system might be known at once
- Mentioned often throughout the 3 volumes

Note at end of Volume 1, that not all contributions were accepted

“Interested papers of high standard have been contributed by G. Gamow, O. Klein and L. Rosenfeld. Since, however, the possibility of misinterpretation in a political and therefore, not purely jocular sense could not be entirely excluded, we regret that they could not be published in the frame of this volume.”

Klein's contribution was a reaction to political events

- In 1935 Mussolini declared Fascist Italy's intent to create an empire that included Ethiopia.
- The League of Nations in Geneva urged Mussolini not to invade.
- Mussolini angrily replied: "Italy will pursue its aims- with Geneva, without Geneva, or against Geneva."



“On Political Quantization” by Oskar Klein

- Referring to Mussolini’s bellicose, “with, without or against,” Klein wrote a humorous piece suggesting that world leaders should learn quantum physics.
- He advised them to make use of the principle of complementarity—with its union of opposites
- Through complementarity, Klein wrote, “Bohr has been able to create almost complete harmony in the atomic world (including Pauli).”

Klein's keen sense of humor

- Wrote humorous letters to Ehrenfest, Gamow and others
- In one such letter to Ehrenfest, dated March 1930, he refers to Copenhagen as “Bohrstadt” and himself as its consule



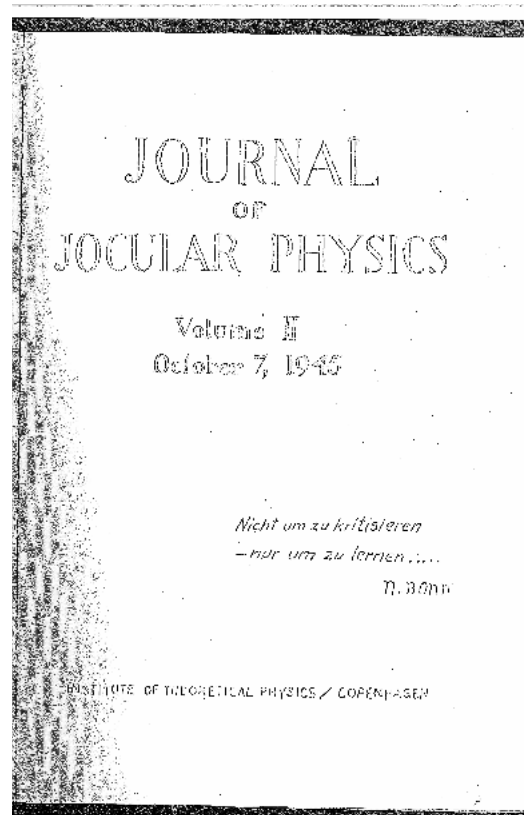
Why was Klein's paper rejected?

- Feeling that physics, as an international endeavour, should remain above politics
- Little desire to anger volatile leaders such as Mussolini
- Risk to Italian physicists such as Fermi

Cover of Journal of Jocular Physics, Volume II, October 7, 1945

“Nicht um zu kritisieren -- nur um zu lernen.”

(Reference to Bohr’s way of learning about topics, “Not to criticize, but...”)



Slim volume, perhaps due to the war effort & recovery

- Mainly in Danish and English
- Absence of German (except for motto on cover)
- Contributors not as well known- except for Rosenfeld, whose piece begins the volume

“My Initiation (paraphysical recollections)” Léon Rosenfeld

- Belgian physicist was one of the closest associates of Bohr & ardent defender of complementarity
- Reference to ‘paraphysics’ - a popular speculative topics of the times



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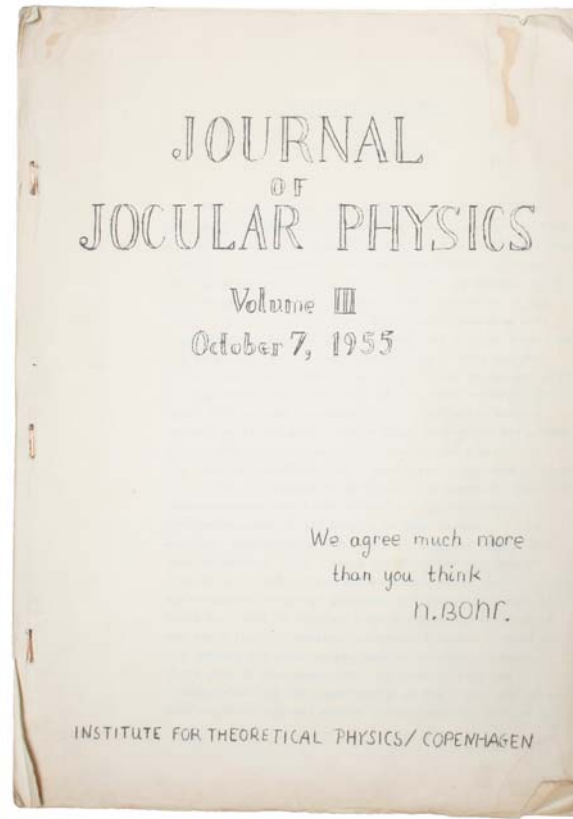
Rosenfeld's "Initiation"

- In the incident described, Bohr explained to Rosenfeld his philosophy in a low, soft voice
- Rosenfeld had to keep moving his head just to hear him and soon became dizzy.
- "You can't even catch glimpse of complementarity if you don't feel completely dizzy."

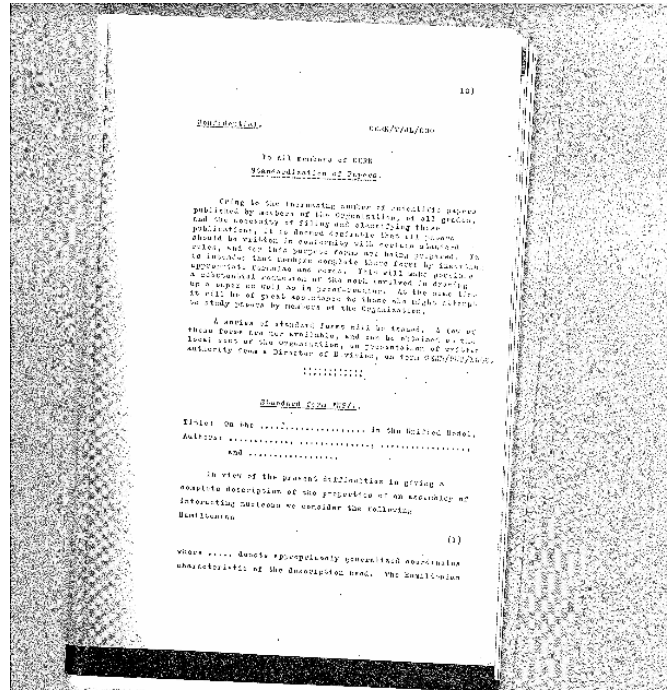
Cover of Journal of Jocular Physics, Volume III, October 7, 1955

“We agree much more than you think.”

(Reference to Bohr’s diplomatic way of reconciling disparate approaches by having their advocates acknowledge similarities.)



CONFIDENTIAL. TO ALL MEMBERS OF CERN: STANDARDIZATION OF PAPERS

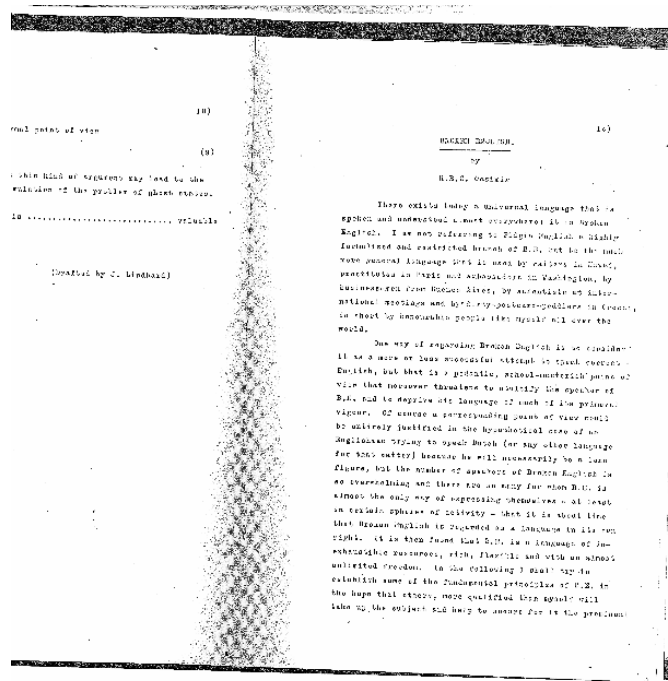


“Owing to the increasing number of scientific papers... it is deemed desirable that all papers should be written in conformity with certain standard rules”

Offers template for standardized papers. For example, field theory papers should start: “According to Schwinger...”

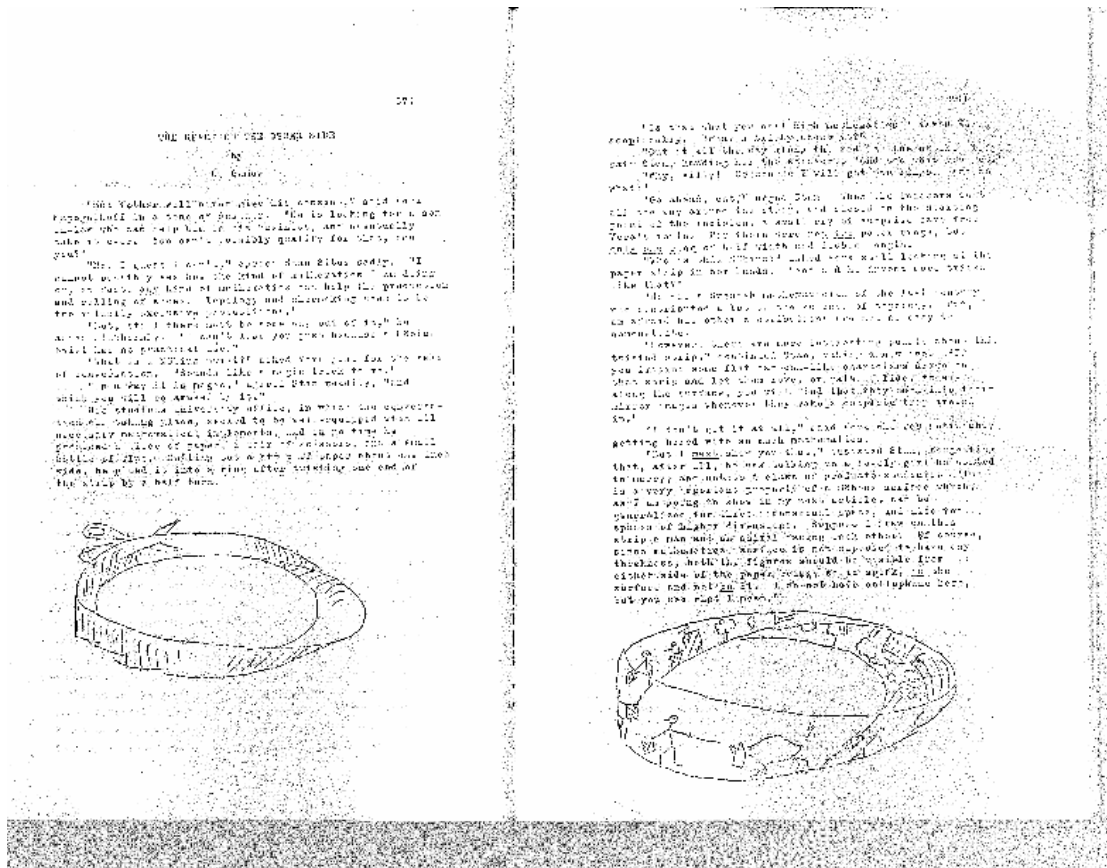
Reflects flood of articles and journals in post-war era

“Broken English” by H. Casimir



Essay on how ‘broken English’ had become the universal means of communication amongst scientists and others after the war.

George Gamow: "The Heart on the Other Side"



Two-dimensional creature changes chirality by moving along a Moebius band

Gamow, by then, had a reputation as a science popularizer



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- Mr. Tompkins series
- “One, Two, Three.. Infinity” (which explored the chirality issue)
- “The Heart on the Other Side” matched the fun, speculative style of his other works

THE ATOM THAT BOHR BUILT (With apologies to Jack from R. E. P.)

THE ATOM THAT BOHR BUILT

(With apologies to Jack from R. E. P.)

This is the atom that Bohr built,
This is the model
That sits in the atom
That Bohr built.

This is the drop
That looks like the nucleus
That sits in the atom
That Bohr built.

These are the nodes
That belong to the drop
That looks like the nucleus
That sits in the atom
That Bohr built.

This is the spectrum
That's due to the nodes
That belong to the drop
That looks like the nucleus
That sits in the atom
That Bohr built.

These are the computed level values
That make up the spectrum
That's due to the nodes
That belong to the drop
That looks like the nucleus
That sits in the atom
That Bohr built.

This is the shell and hole in the atom
That performs the observed level values
That make up the spectrum
That's due to the nodes
That belong to the drop
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Author: Oxford nuclear physicist Rudolph E Peierls
(shown below on the right, next to Aage Bohr)



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Poem describes how all the study of all facets of the atom, from the nucleus to complementarity, owes a debt to Bohr

“This is the atom that Bohr built.

This is the nucleus
That sits in the atom
That Bohr built

This is the drop
That looks like the nucleus
That sits in the atom
That Bohr built...

This is the day we celebrate Bohr
Who gave us the complementarity
law
That gives correspondence (as
Bohr said before)
That holds in the shell, as well as
the core
That possesses the compound
levels galore
That make up the spectrum
That's due to the nodes
That belong to the drop
That looks like the nucleus
That sits in the atom
That Bohr built

Conclusions

- Journal of Jocular Physics offers a glimpse at perceptions of Bohr & his philosophy, particularly complementarity
- Characterizes Bohr's achievements as extraordinary but enigmatic
- Individual contributions provide insight into the issues of the time, including major questions in physics such as the nature of the neutrino, as well as non-scientific topics such as politics.

References

1. Faust and Journal of Jocular Physics Volumes I, II, & III, Copenhagen: Niels Bohr Archive, 1985.
2. George Gamow, Thirty Years that Shook Physics: The Story of Quantum Theory, New York: Doubleday & Co., 1966.
3. Oskar Klein, “On Political Quantization.” Unpublished letter submitted to the Journal of Jocular Physics (1935). Niels Bohr Archive, Copenhagen.

Acknowledgments

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Photos of physicists courtesy of Emilio Segré
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