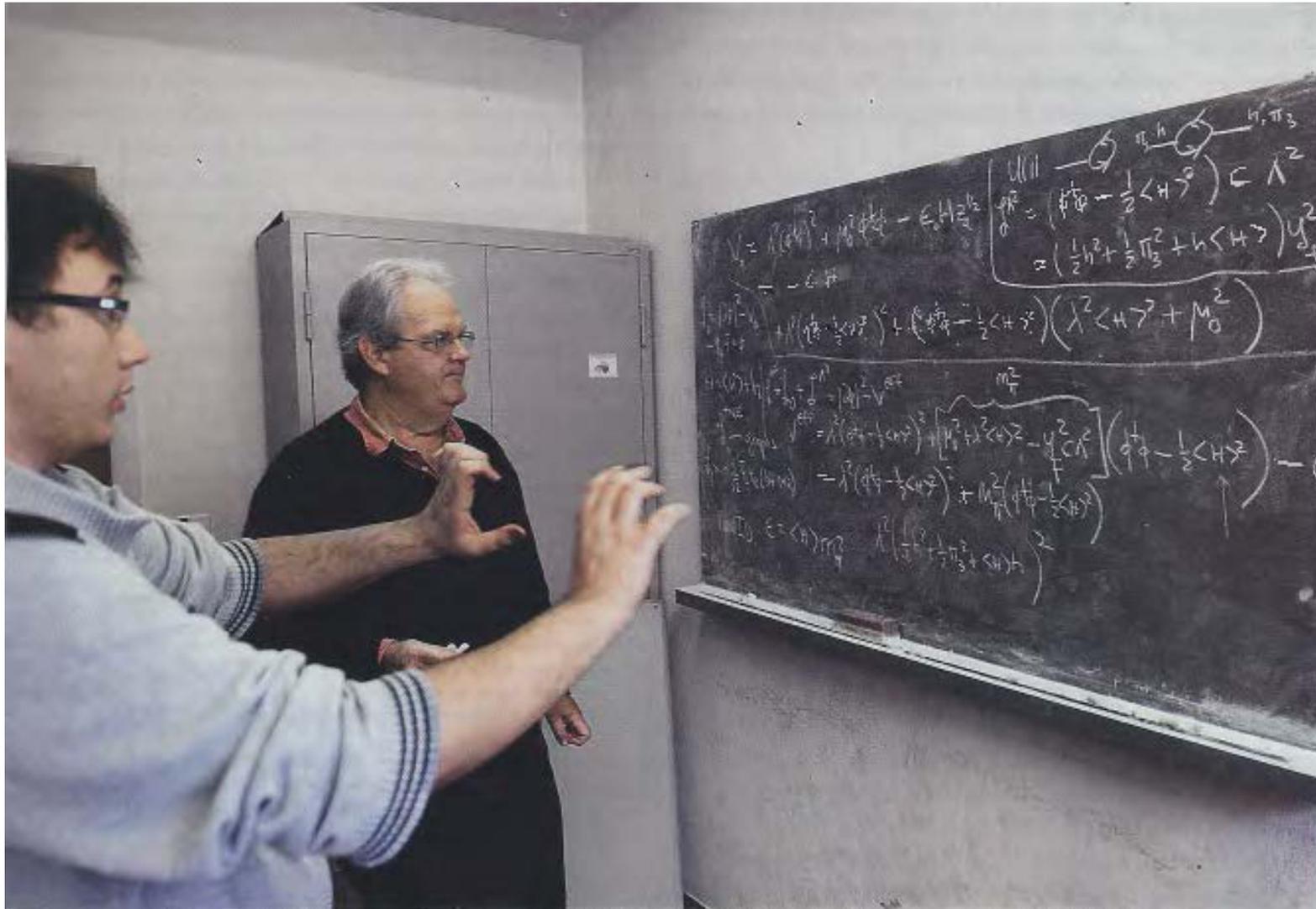
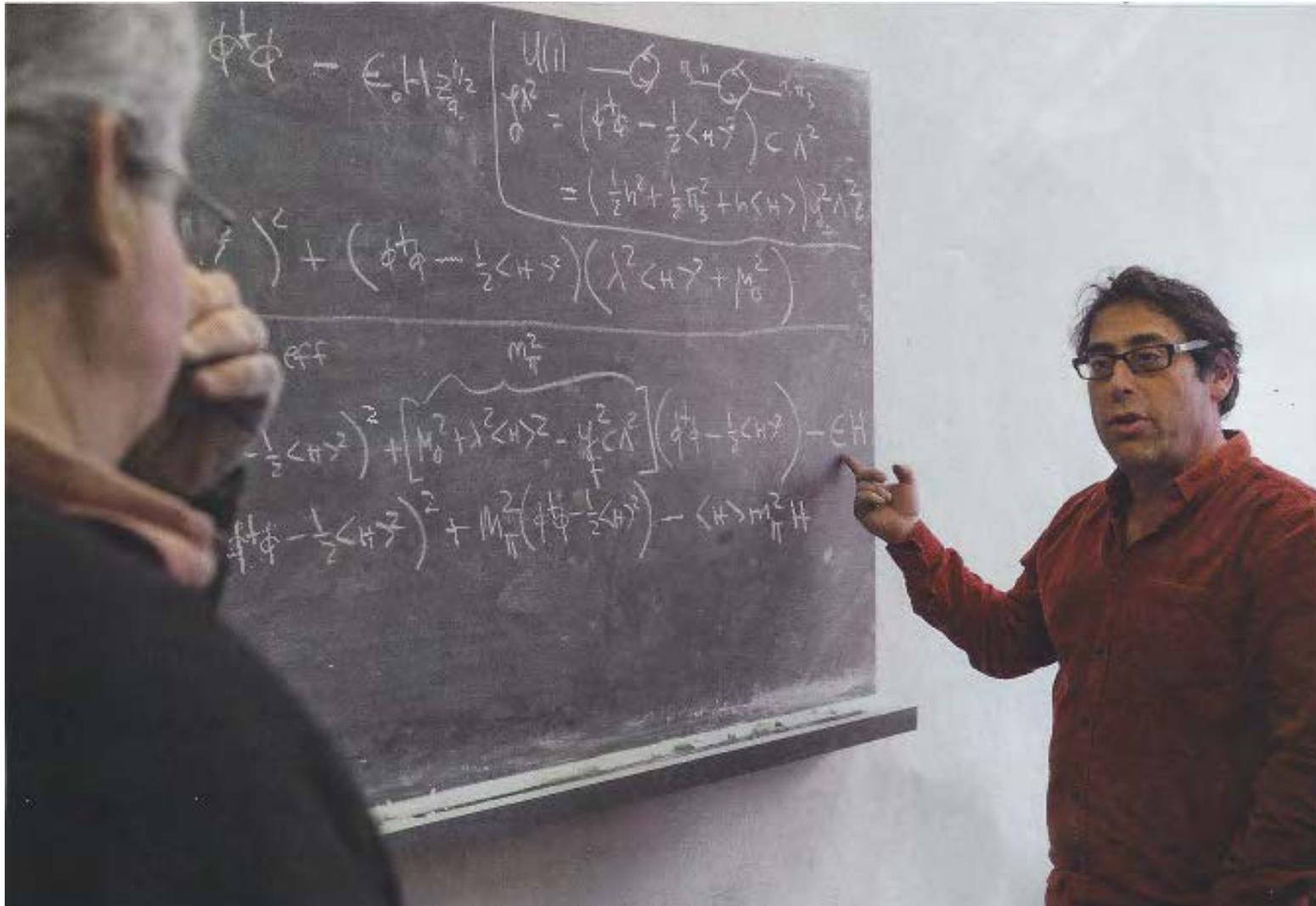


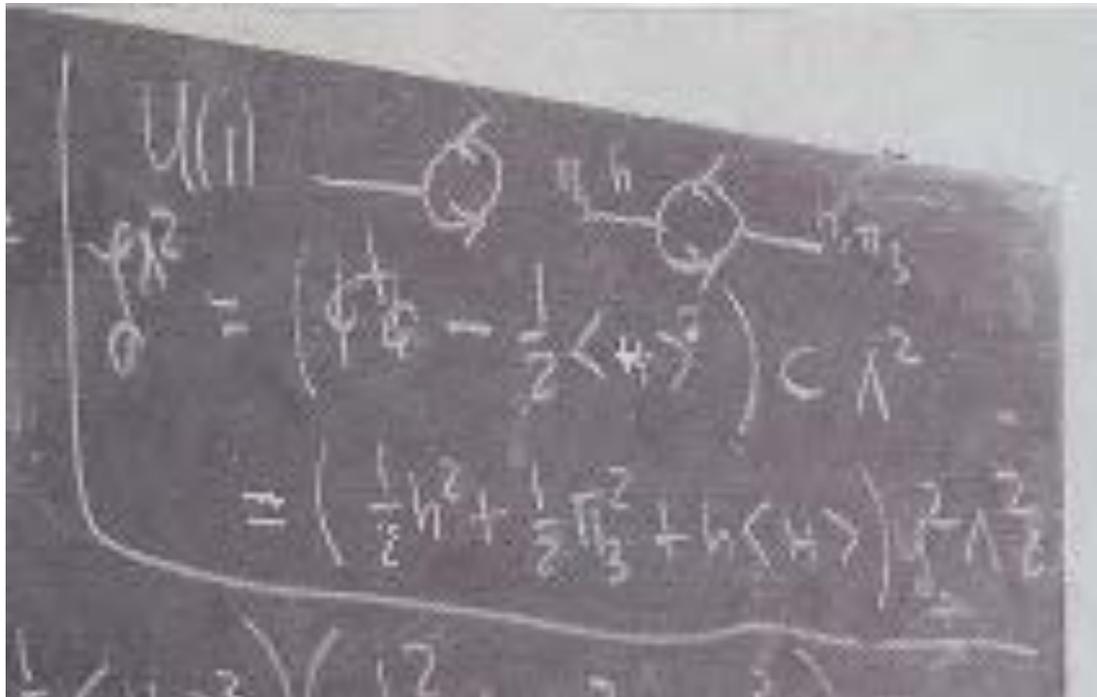
Let's talk about math ...



... without being shocked



... at looking at this expression



blackboard CERN 2014

Question:

What are the symbolic elements or operators of this expression?

Please read and explain!

Observation „symbol shock“

About 1/3 of young people between 16 and 20 on their way to their professional future in skilled crafts are not literate neither in skilled reading/comprehension nor in reading mathematical expressions or symbolic signs as used in mathematics, chemistry, music or logic. etc.

As one of several explanations of this kind of „illiteracy“ we propose to take in account, that the language of physics, mathematics as well as music and chemistry etc. contains possible „shock inducing elements“.

Symbol shock are equivalent to „non-meaningfull gaps“, which a student cannot interpret or fill with any meaning.

Example of a „shock element“

The experience that in mathematical context the letter „r“ can be interpreted differently (letter of the latin alphabet, unknown mathematical symbol, measure of covariance, regression etc.) can set free „metacognitiv emotions“ called „symbol shock“.

The perception of „r“ which has a a letter an exact meaning in a mathematical setting ca be interpreted on different levels of perception. There are at least 7 different interpretations.

To know that there are not all interpretations of „r“ known to a student may lead to „metacognitive disbalance“ or symbol shock.

Reactions of „symbol shock“

When students in a half-experimental setting in lecture-room were confronted with unfamiliar mathematical expressions many different „shock reactions“ have been observed:

- oh god, now I can go home;
- when I just see such a formula, then I'm upset;
- nobody can understand this stuff;
- now I need something to drink etc..

And the following behaviors have been observed:

- leaving the room;
- expression of being mentally absent;
- throwing the pencils away etc..

Shock releasing coaching

On the basis of a swiss reference textbook on "discussing mathematics" (Mathematik im Gespräch) in search of understanding in mathematics teaching we encourage young people in an individual setting of coaching to learn to "read and interpret" mathematical expressions/operators/complexors for a basic comprehension.

We encourage young people to try to interpret each symbolic sign with a possible meaning und encourage to use self-invented signs and symbols as in comics to express the „same“ meaning if possible. This may lead to a better understanding of operators.

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