



200th Journal Club on Phenomenology

PhenClub History – Very Short!

Robert Harlander

The idea

R.H., Sabine Kraml, German Rodrigo, Thomas Teubner



Inspired by **Coffee**

The idea

R.H., Sabine Kraml, German Rodrigo, Thomas Teubner



Inspired by **CosmoCoffee**

The idea

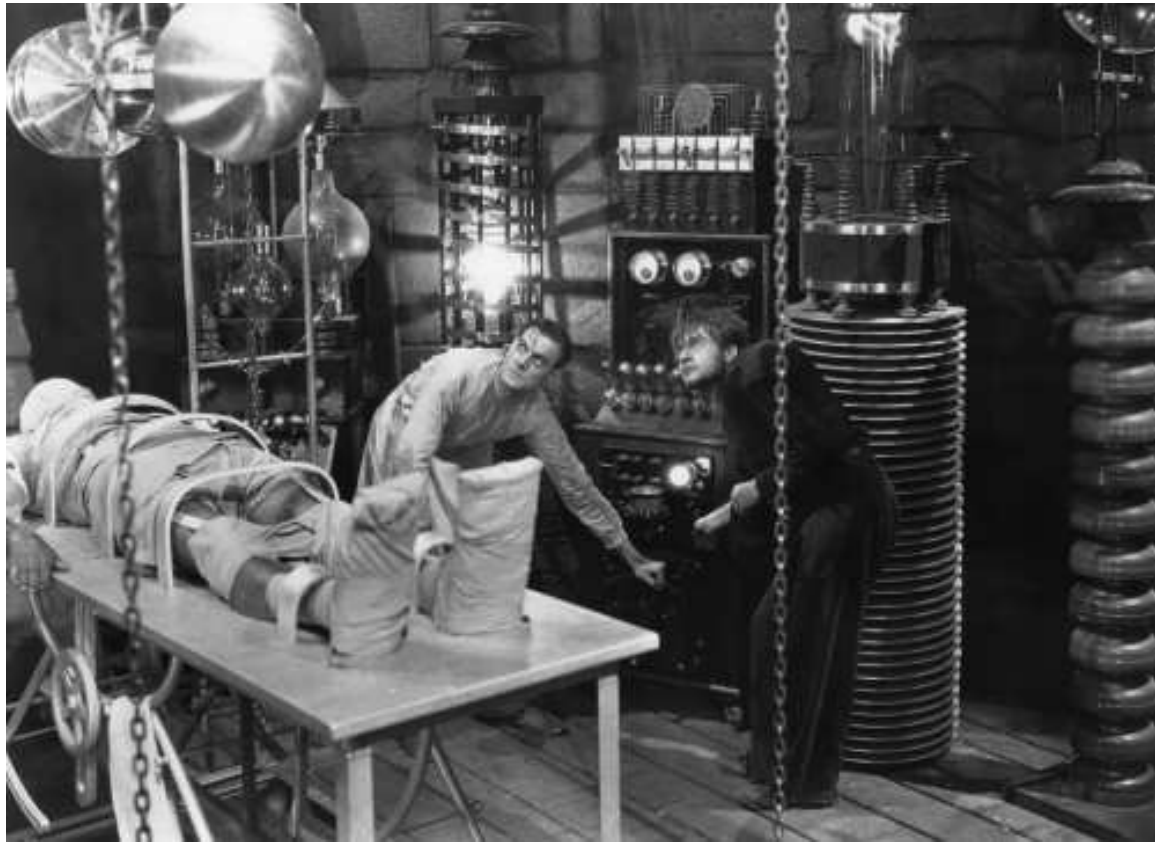
R.H., Sabine Kraml, German Rodrigo, Thomas Teubner



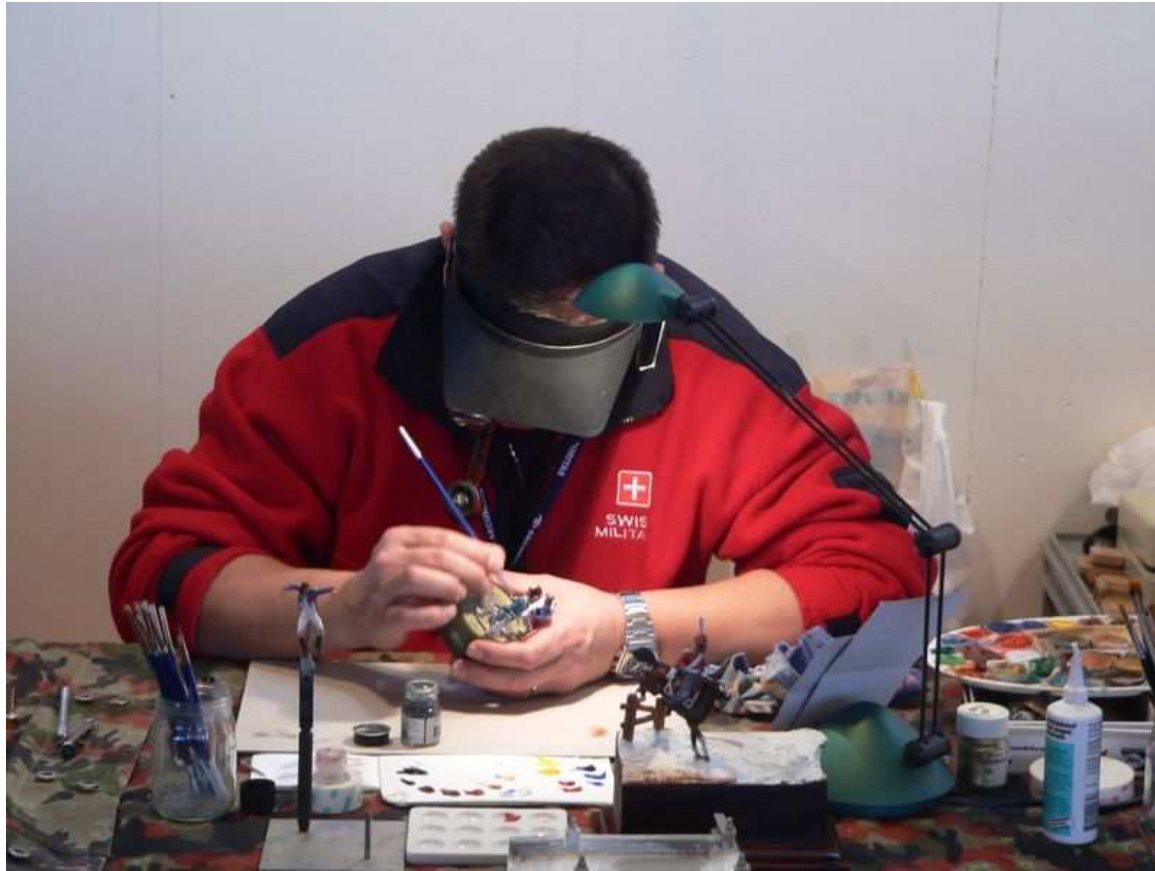
Inspired by **CosmoCoffee**

- open forum to discuss papers
- short talk on specific subject

Experiment



Model Building



Phenomenology

$$\begin{aligned}
& + \frac{1}{2}S_{1,2,1} - \frac{83}{2}S_{1,-2} + 27S_2\zeta_3 - 8S_{2,-3} + \frac{3}{2}S_{2,-2} + 8S_{2,-2,1} - \frac{183}{4}S_4 + 8S_{2,1,-2} - \frac{117}{4}S_{2,1,1} \\
& - 3S_{2,1,2} + \frac{157}{4}S_{2,2} - 3S_{2,2,1} - \frac{9}{2}S_{2,3} - \frac{581}{16}S_3 - S_{3,-2} + \frac{237}{4}S_{3,1} - 8S_{3,1,1} + 8S_{3,2} + \frac{73}{3}S_{2,1} \\
& - \frac{4319}{48}S_2 \Big) + 16C_A\eta_f^2 \Big(\frac{1}{6}(\mathbf{N}_- + 4\mathbf{N}_+ - 2\mathbf{N}_{+2} - 3) \Big[\frac{175}{27}S_1 - 2S_{1,-3} + \frac{7}{3}S_{1,-2} - \frac{7}{9}S_{1,1} + \frac{4}{3}S_3 \\
& + \frac{7}{3}S_{1,1,1} - S_{1,1,1,1} + S_{1,1,2} - S_{1,2,1} - S_{1,3} + \frac{229}{18}S_2 \Big] + \frac{1}{6}(\mathbf{N}_- - 1) \Big[S_{1,-2} - \frac{4}{3}S_{1,1} + S_{1,1,1} \Big] \\
& - \frac{53}{162}(\mathbf{N}_- - 1)S_1 - (\mathbf{N}_- - \mathbf{N}_+) \Big[\frac{149}{648}S_1 + \frac{7}{4}S_2 - \frac{2}{9}S_3 - \frac{1}{3}S_4 \Big] - (1 - \mathbf{N}_+) \Big[\frac{473}{648}S_1 - \frac{169}{36}S_2 \\
& + \frac{1}{6}S_{2,1} - \frac{43}{18}S_3 + \frac{5}{3}S_4 \Big] \Big) + 16C_A^2\eta_f \Big((\mathbf{N}_- + 4\mathbf{N}_+ - 2\mathbf{N}_{+2} - 3) \Big[\frac{3220}{27}S_1 - \frac{3}{2}S_{1,-4} + \frac{277}{12}S_{1,-2} \\
& - \frac{31}{2}S_1\zeta_3 + \frac{61}{6}S_{1,-3} + 2S_{1,-3,1} + 3S_{1,-2,-2} - \frac{8}{3}S_{1,-2,1} + 2S_{1,-2,1,1} - 2S_{1,1,-2,1} + 6S_{1,1,1,-2} \\
& - \frac{95}{54}S_{1,1} - 3S_{1,1}\zeta_3 + 2S_{1,1,-3} + \frac{20}{3}S_{1,1,-2} + \frac{47}{8}S_{1,1,1} + \frac{4}{3}S_{1,1,1,1} + 2S_{1,1,1,1,1} - S_{1,1,3} + \frac{37}{6}S_{1,3} \\
& + 4S_{1,1,2} + \frac{21}{4}S_{1,1,2} + 2S_{1,1,2,1} + \frac{69}{8}S_{1,2} - S_{1,2,-2} + \frac{23}{12}S_{1,2,1} - 3S_{4,1} + 2S_{2,3} - \frac{5}{2}S_{1,4} + 9S_2 \\
& - 3S_2\zeta_3 - S_{2,-3} + \frac{25}{2}S_{2,-2} + 2S_{2,-2,1} - \frac{155}{72}S_{2,1} + \frac{53}{6}S_{2,1,1} + 3S_{1,3,1} - \frac{5}{12}S_{2,2} + \frac{31}{12}S_{3,1} - 3S_4 \\
& + \frac{2561}{72}S_3 - 2S_{1,2,2} \Big] + (\mathbf{N}_- - 1) \Big[4S_1\zeta_3 - \frac{2351}{108}S_1 - \frac{8}{3}S_{1,-3} - \frac{4}{3}S_{1,1,2} - \frac{52}{9}S_{1,-2} + \frac{4}{3}S_{1,-2,1} \\
& + \frac{161}{36}S_{1,1} - \frac{4}{3}S_{1,1,-2} - \frac{10}{9}S_{1,1,1} + \frac{2}{3}S_{1,1,1,1} - \frac{3}{2}S_{1,2} + \frac{56}{27}S_2 - \frac{20}{9}S_{2,1} - 2S_{1,3} - \frac{2}{3}S_{2,1,1} \Big] \\
& - (\mathbf{N}_- - 1)S_{1,2,1} + (\mathbf{N}_- - \mathbf{N}_+) \Big[22S_1\zeta_3 - \frac{1759}{24}S_1 - \frac{13}{6}S_{1,-3} - \frac{799}{36}S_{1,-2} - \frac{8}{3}S_{1,-2,1} - \frac{21}{2}S_{1,3} \\
& - \frac{37}{3}S_{1,1,-2} - \frac{425}{72}S_{1,1,1} - \frac{7}{12}S_{1,1,1,1} - \frac{35}{6}S_{1,1,2} - \frac{217}{24}S_{1,2} - \frac{1385}{18}S_2 + \frac{593}{36}S_{1,1} - \frac{49}{6}S_{2,1,1} \\
& + \frac{5}{2}S_{2,-3} - 8S_{2,-2} - \frac{209}{24}S_{2,1} + 3S_{2,1,-2} - S_{2,1,1,1} + 2S_{2,1,2} + \frac{17}{12}S_{2,2} - 6S_2\zeta_3 + \frac{13}{4}S_{2,3} + \frac{9}{4}S_{4,1} \\
& - \frac{1363}{72}S_3 + \frac{9}{2}S_{3,-2} + \frac{1}{6}S_{3,1} + 3S_{3,1,1} + \frac{25}{6}S_4 + 4S_5 \Big] + (1 - \mathbf{N}_+) \Big[\frac{15}{4}S_{2,2} + \frac{1783}{24}S_1 - 41S_1\zeta_3 \\
& + \frac{4}{3}S_{1,-3} + \frac{995}{36}S_{1,-2} + \frac{16}{3}S_{1,-2,1} - \frac{2731}{72}S_{1,1} + \frac{62}{3}S_{1,1,-2} + \frac{319}{72}S_{1,1,1} - \frac{7}{12}S_{1,1,1,1} + \frac{49}{6}S_{1,1,2} \\
& + \frac{287}{24}S_{1,2} + \frac{79}{4}S_{1,3} + \frac{73141}{216}S_2 - 24S_2\zeta_3 + \frac{17}{2}S_{2,-3} + \frac{93}{2}S_{2,-2} - \frac{1567}{72}S_{2,1} - \frac{34}{3}S_4 - \frac{15}{4}S_{4,1} \\
& + 7S_{2,1,-2} + \frac{167}{6}S_{2,1,1} - 3S_{2,1,1,1} + 6S_{2,1,2} + \frac{53}{4}S_{2,3} + \frac{7385}{72}S_3 - \frac{7}{2}S_{3,-2} + \frac{47}{4}S_{3,1} + 5S_{3,1,1} \\
& - 19S_5 \Big] \Big) + 16C_F\eta_f^2 \Big((\mathbf{N}_- + 4\mathbf{N}_+ - 2\mathbf{N}_{+2} - 3) \Big[\frac{2303}{324}S_1 + \frac{7}{54}S_{1,1} - \frac{7}{18}S_{1,1,1} - \frac{1}{6}S_{1,1,1,1} - S_4 \\
& + \frac{4}{9}S_{1,2} + \frac{1}{6}S_{1,1,1,1} - \frac{1}{3}S_{1,3} + \frac{35}{18}S_2 + \frac{7}{18}S_{2,1} - \frac{11}{9}S_3 \Big] - \frac{1}{6}(\mathbf{N}_- - 1) \Big[S_{1,1,1} + S_{1,2} - S_{2,1} \Big] \\
& - (\mathbf{N}_- - \mathbf{N}_+) \Big[\frac{59963}{2592}S_1 - \frac{7}{18}S_{1,1} - \frac{251}{27}S_2 + \frac{199}{24}S_3 - \frac{25}{6}S_4 + 2S_5 \Big] + (1 - \mathbf{N}_+) \Big[\frac{163}{24}S_2 + 6S_5 \\
& + \frac{96277}{2592}S_1 - \frac{17}{36}S_{1,1} - \frac{7}{24}S_3 - \frac{19}{2}S_4 \Big] + \frac{77}{81}(\mathbf{N}_- - 1)S_1 \Big) + 16C_F^2\eta_f \Big((\mathbf{N}_- - 1) \Big[4S_{2,1,-2}
\end{aligned}$$

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$$\begin{aligned}
& + \frac{1}{2}S_{2,2} \Big] + (\mathbf{N}_- + 4\mathbf{N}_+ - 2\mathbf{N}_{+2} - 3) \Big[\frac{81}{32}S_1 - S_{1,-4} + 5S_{1,-3} - \frac{5}{2}S_{1,-2} + 2S_{1,-2,-2} + 4S_{1,1,-3} \\
& + \frac{87}{8}S_{1,1} - 4S_{1,1,-2} + \frac{61}{8}S_{1,1,1} + 3S_{1,1,1,1} + 2S_{1,1,1,1,1} - S_{1,1,1,2} - \frac{5}{2}S_{1,1,2} + 7S_{1,3,1} - 3S_{1,4} \\
& - 5S_{1,1,2,1} + 4S_{1,1,3} - \frac{17}{2}S_{1,2} + 2S_{1,2,-2} - \frac{11}{2}S_{1,2,1} - 6S_{1,2,1,1} + 6S_{1,2,2} + \frac{5}{2}S_{1,3} - \frac{87}{8}S_2 + 4S_5 \\
& - 4S_{2,-3} + 4S_{2,-2} - \frac{61}{8}S_{2,1} - 3S_{2,1,1} - 2S_{2,1,1,1} + S_{2,1,2} + \frac{5}{2}S_{2,2} + 5S_{2,2,1} - 4S_{2,3} + 6S_{3,1,1} \\
& + 11S_3 - 4S_{3,-2} + \frac{11}{2}S_{3,1} - 6S_{3,2} - \frac{15}{2}S_4 - 7S_{4,1} \Big] + (\mathbf{N}_- - \mathbf{N}_+) \Big[\frac{801}{64}S_1 + \frac{27}{2}S_1\zeta_3 - \frac{3}{2}S_{1,2} \\
& + 3S_{1,-3} - \frac{35}{2}S_{1,-2} - \frac{103}{8}S_{1,1} - 4S_{1,1,-2} - \frac{7}{8}S_{1,1,1} - \frac{13}{4}S_{1,1,1,1} + \frac{9}{2}S_{1,1,2} + \frac{7}{2}S_{1,2,1} - \frac{1}{2}S_{2,1,1,1} \\
& - \frac{9}{2}S_{1,3} + \frac{1}{4}S_4 - 3S_2\zeta_3 + 7S_{2,-2} + \frac{27}{8}S_{2,1} + \frac{3}{4}S_{2,1,1} + S_{2,1,2} - S_{2,2,1} + 3S_{2,3} - \frac{87}{16}S_3 - S_{3,1,1} \\
& - \frac{13}{4}S_{3,1} + 2S_{3,2} + \frac{27}{4}S_4 + \frac{7}{2}S_{4,1} - 3S_5 \Big] + (1 - \mathbf{N}_+) \Big[17S_{1,1} - \frac{1759}{64}S_1 - \frac{63}{2}S_1\zeta_3 + \frac{17}{4}S_{1,1,1,1} \\
& - 11S_{1,-3} + \frac{71}{2}S_{1,-2} + 12S_{1,1,-2} - \frac{19}{8}S_{1,1,1} - \frac{13}{2}S_{1,1,2} + \frac{13}{2}S_{1,2} - \frac{3}{2}S_{1,2,1} + \frac{13}{2}S_{1,3} - 3S_2\zeta_3 \\
& - \frac{409}{16}S_2 - 4S_{2,-3} - S_{2,-2} + \frac{59}{8}S_{2,1} - \frac{1}{4}S_{2,1,1} + \frac{3}{2}S_{2,1,1,1} - 3S_{2,1,2} + 3S_{2,2,1} - 5S_{2,3} + \frac{565}{16}S_3 \\
& - 8S_{3,-2} + \frac{17}{4}S_{3,1} + 3S_{3,1,1} - 6S_{3,2} - \frac{103}{4}S_4 - \frac{21}{2}S_{4,1} + 11S_5 \Big] \Big) \quad (3.11)
\end{aligned}$$

and

$$\begin{aligned}
\gamma_{\text{gg}}^{(2)}(N) = & 16C_A C_F \eta_f \Big((2\mathbf{N}_- - 4\mathbf{N}_+ - \mathbf{N}_+ + 3) \Big[\frac{967}{144}S_1 - 2S_1\zeta_3 + \frac{2}{3}S_{1,-3} + \frac{41}{18}S_{1,-2} - \frac{1}{3}S_{1,3} \\
& - \frac{2}{3}S_{1,-2,1} + \frac{251}{108}S_{1,1} - \frac{4}{3}S_{1,1,-2} - \frac{13}{4}S_{1,1,1} + \frac{5}{6}S_{1,1,1,1} - \frac{5}{6}S_{1,1,2} + \frac{10}{9}S_{1,2} - \frac{5}{6}S_{1,2,1} - \frac{151}{108}S_2 \\
& - \frac{1}{3}S_{2,-2} + \frac{10}{9}S_{2,1} - \frac{5}{6}S_{2,1,1} + \frac{1}{3}S_{2,2} \Big] + (\mathbf{N}_- - \mathbf{N}_+) \Big[\frac{331}{72}S_1 - 4S_{2,-2} + \frac{28}{9}S_{1,-2} - \frac{11}{18}S_{1,1,1} \\
& + \frac{4}{3}S_{3,1} - \frac{2}{9}S_{2,1} + \frac{53}{54}S_{1,1} - \frac{733}{54}S_2 + \frac{4}{3}S_{2,1,1} - \frac{22}{3}S_3 \Big] + (1 - \mathbf{N}_+) \Big[\frac{10}{3}S_{2,-2} + \frac{1}{12}S_{2,1} - \frac{1}{4}S_{1,1} \\
& - \frac{17}{3}S_{1,-2} - \frac{137}{144}S_1 + \frac{5}{6}S_{1,2} + \frac{1}{4}S_{1,1,1} + \frac{565}{36}S_2 - S_{2,1,1} + \frac{35}{12}S_3 - \frac{2}{3}S_{3,1} \Big] - \frac{2}{9}(\mathbf{N}_- - \mathbf{N}_{+2}) \Big[S_3 \\
& - 3S_{2,1} + \frac{131}{4}S_1 + S_{1,-2} - \frac{25}{6}S_{1,1} - S_{1,1,1} + \frac{125}{6}S_2 \Big] - \frac{2}{3}(\mathbf{N}_- - 1)S_4 \Big) + 16C_A C_F^2 \Big((2\mathbf{N}_- - 4\mathbf{N}_+ - \mathbf{N}_+ + 3) \Big[\frac{163}{32}S_1 - \frac{3}{2}S_{1,-4} - \frac{3}{2}S_{1,-3} + \frac{6503}{432}S_{1,1} - 5S_{1,-2,-2} - 3S_{1,-2,1} - 4S_{1,1,1,1} \\
& + S_{1,-2} + 2S_{1,-2,1} - 9S_{1,1}\zeta_3 - 4S_{1,1,-3} + 3S_{1,1,-2} + 2S_{1,1,-2,1} + 5S_{1,1,3} + 6S_{1,1,1,1} - 2S_{1,1,2,1} \\
& + 3S_{1,1,2,2} + \frac{35}{3}S_{1,1,1,1} + \frac{2}{9}S_{1,1,1} - \frac{1}{12}S_{1,1,2} - \frac{191}{24}S_{1,2} - 3S_{1,2,-2} - \frac{41}{12}S_{1,2,1} + 4S_{1,3} - 4S_{2,1} \\
& + 2S_{2,1,1} - \frac{5}{2}S_{1,4} - \frac{9}{2}S_{2,1,1} + 2S_{2,1,1,1} + S_{2,1,2} + 3S_{2,2} + S_{2,2,1} - 2S_{2,3} \Big] + (\mathbf{N}_- - \mathbf{N}_{+2}) \Big[6S_{2,1} \\
& + \frac{173}{54}S_{1,1} - \frac{26}{9}S_{1,1,1} - \frac{2}{3}S_{1,1,1,1} - \frac{335}{54}S_2 + \frac{7}{2}S_1 - 2S_{2,1,1} - \frac{28}{9}S_3 + \frac{8}{3}S_4 \Big] - 6(\mathbf{N}_- - 1) \Big[S_{2,-3}
\end{aligned}$$

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Lattice



Strings



First meeting

21 Feb 2002

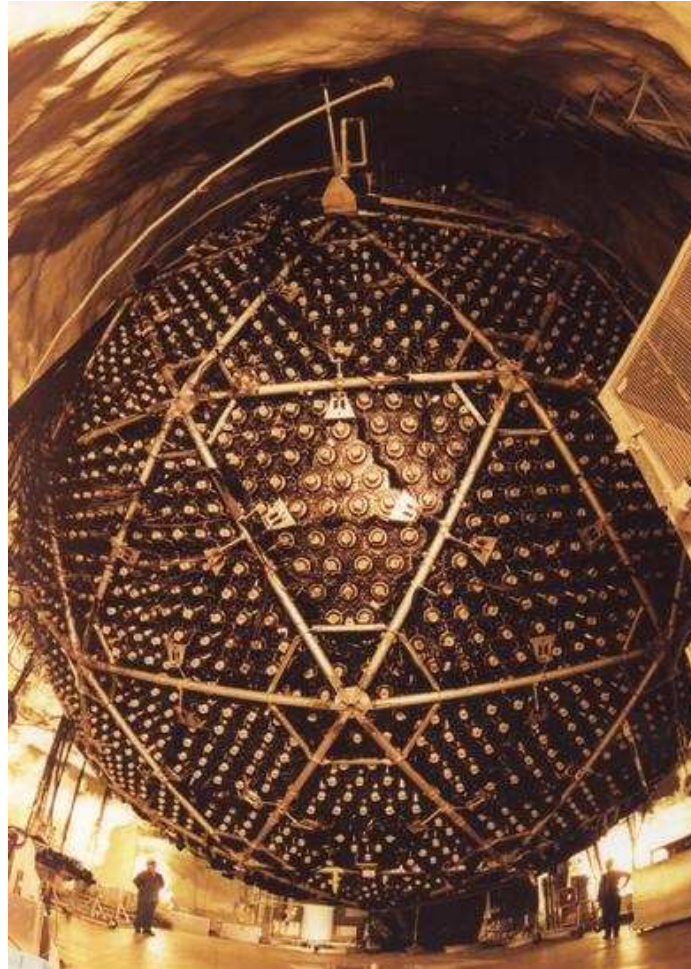
Our first meeting -- 25 participants gave the journal club on phenomenology a good start.

- Papers discussed:
 - [hep-ph/0201206](#): *Next-to-Next-to-Leading Order Higgs Production at Hadron Colliders* -- by R. Harlander and W.B. Kilgore
 - [hep-ph/0201114](#): *Next-to-leading order QCD corrections to differential distributions of Higgs boson production in hadron-hadron collisions* -- by V. Ravindran, J. Smith and W.L. van Neerven
- Paolo Gambino told us about the NuTeV anomaly, see [hep-ex/0110059](#) and [hep-ph/0112302](#).

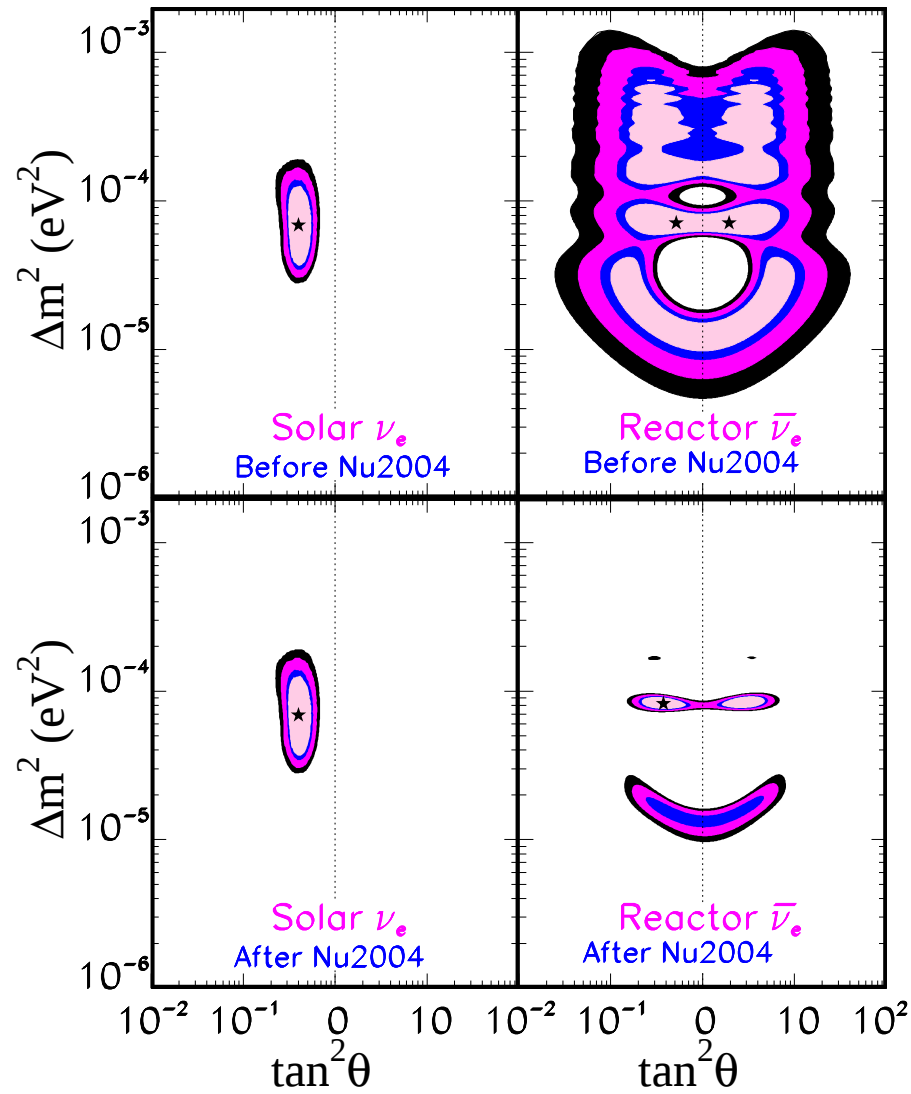
Topics

- Fundamental Units
- SCET
- $M_H \leftrightarrow M_t$
- Split Supersymmetry
- ...

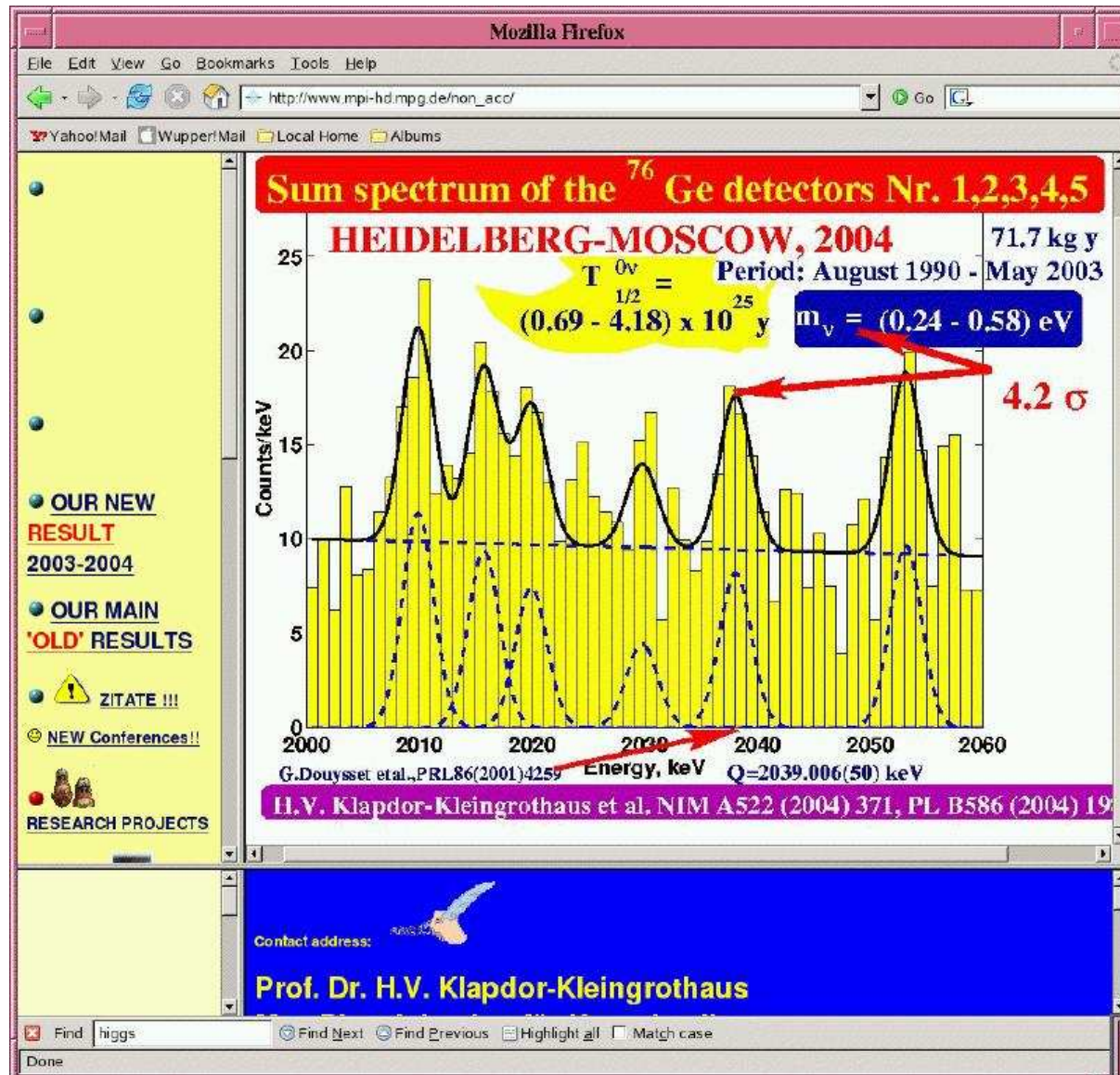
Neutrinos



Neutrinos



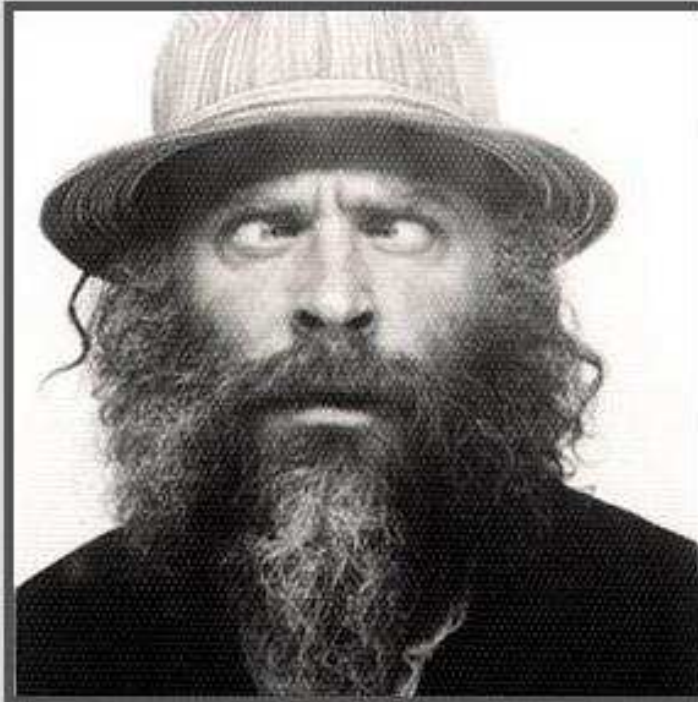
$$2\nu 0\beta$$



Moose



Little Higgs

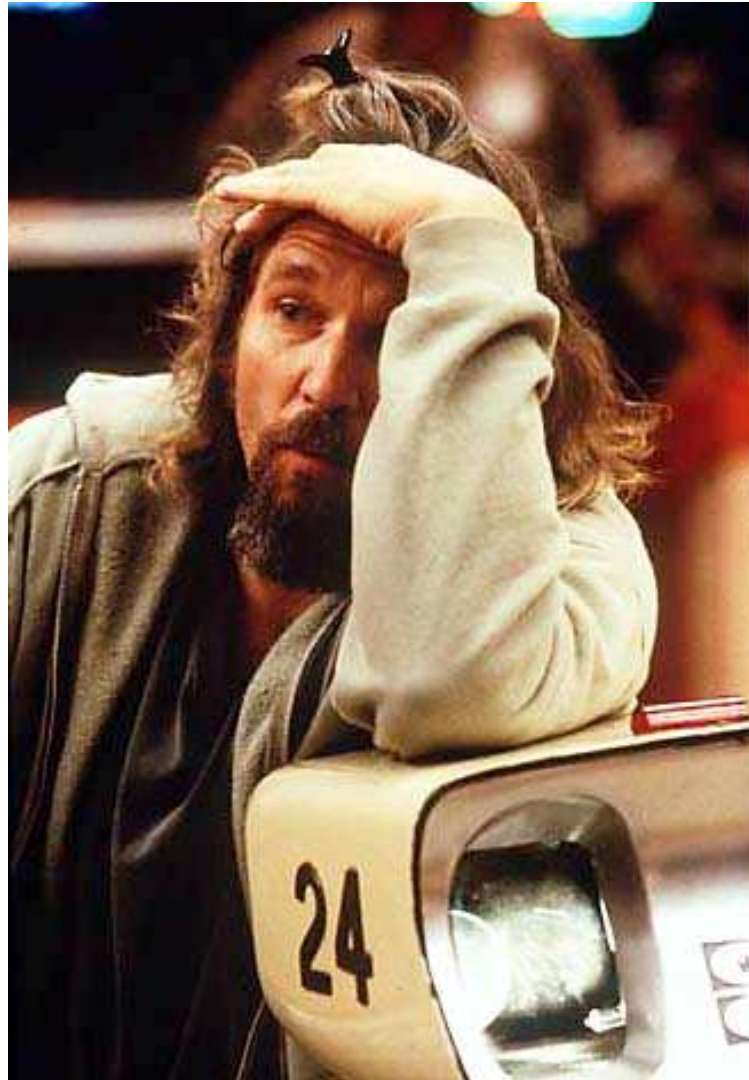


Daniel Higgs (voice, jews harp)

Daniel Higgs (Embryo Rainhood, Your bother Apostrophe Truth Forms) was born in Baltimore in 1964. He began singing in 1980, began playing the jews harp in 1987, and founded The Ignorance Research Institute in 1995. The simplicity of the jews harp is deceptive. If it is to be understood as a highly sensitive exo-larynx, the player may sing/speak with a new voice, the conjoined

utterance of animal, mineral, and air. Its melodic constraints circumscribe hidden orchards of melody, sub-quasi-ultra-intra-melody, that goad the player toward mystic, melodic resonance whereupon the non lingual word may be enunciated and heard.

Little Lebowski





The dark chapters...

The dark chapters...

flavor@cern

VS.

PhenClub

50th PhenClub – 15 May 2003



100th PhenClub – 2 Sep 2004



100th PhenClub – 2 Sep 2004



PhenClub organisers through time

Sabine Kraml since Feb 2002

Giulia Zanderighi since Nov 2005

Agustin Sabio Vera since ?

Pietro Slavich since Oct 2006

Robert Harlander Feb 2002 - Oct 2003

Thomas Teubner Feb 2002 - Oct 2003

German Rodrigo Feb 2002 - Mar 2004

Mrinal Dasgupta Nov 2003 - Sep 2004

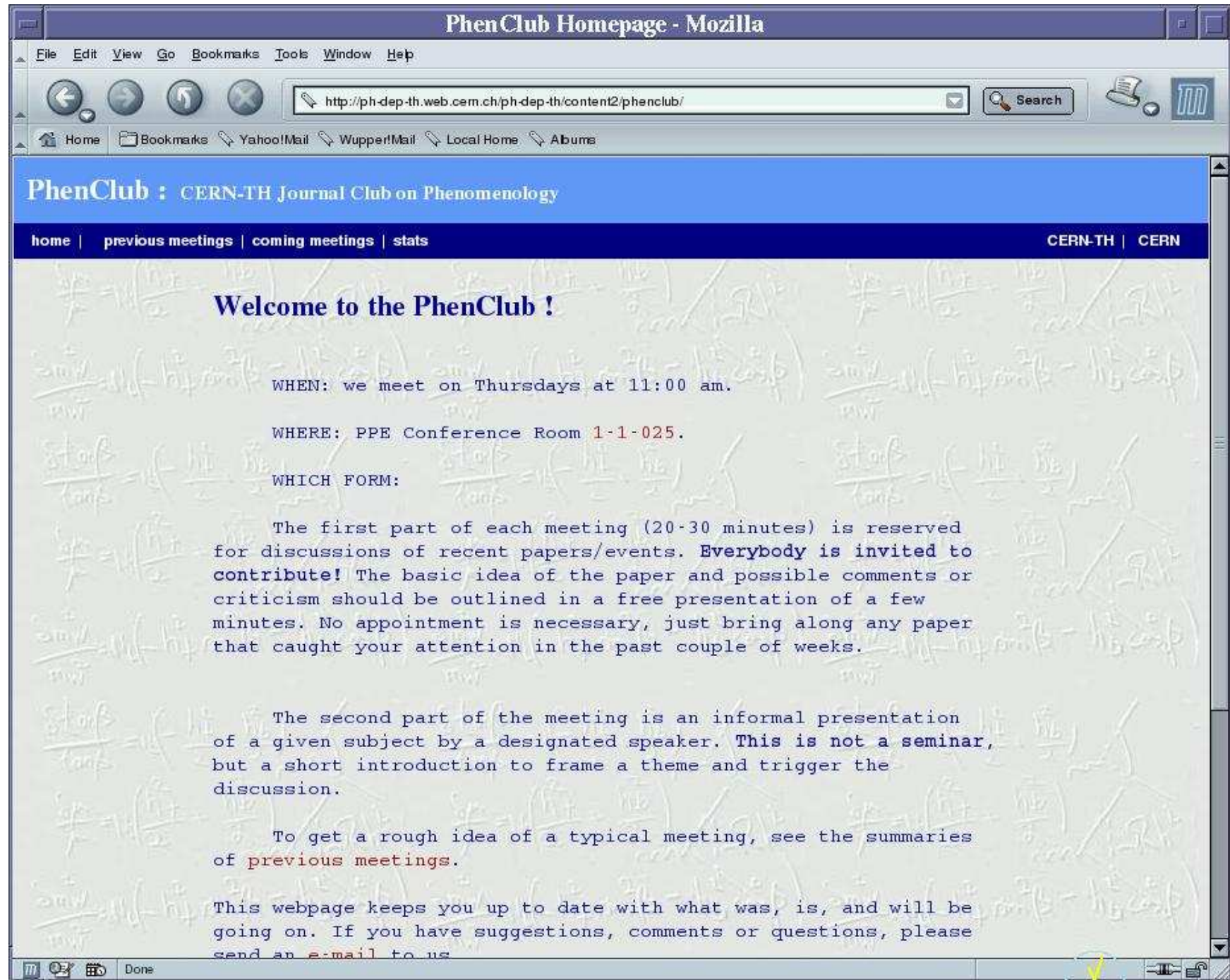
Torsten Feldmann Aug 2003 - Oct 2004

Laura Covi Mar 2004 - Spring 2005

Adam Ritz Jul 2004 - Sep 2005

Sven Heinemeyer Oct 2004 - Nov 2005

Stephan Huber May 2005 - Oct 2006



Max-Planck-Institut für Physik:

Journal Club on **C**osmology, **R**adiative Corrections, **A**stro-Particle and Collider **P**henomenology

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Welcome to the physics journal club !

We meet on Thursdays at 11:00am in the seminar room SR 313

The first part of each meeting (20-30 minutes) is reserved for discussions of recent papers/events. **Everybody is invited to contribute!** The basic idea of the paper and possible comments or criticism should be outlined in a free presentation of a few minutes. No appointment is necessary, just bring along any paper that caught your attention in the past couple of weeks.

The second part of the meeting is an informal presentation of a given subject by a designated speaker. **This is not a seminar**, but an introduction into a topic designed to trigger a lively discussion.

Instructions for speakers:

If your topic is really interesting we may let you speak for up to half an hour, but you should plan to be done after twenty minutes. Further, it's supposed to be a blackboard presentation, i.e. laptops, data projectors and other electronic helpers are not permitted. If you bring them anyway you run the risk that we'll just chuck them out the window. A few transparencies with plots are permitted though.

Warning:

We expect you to mention at least one observable.

If you have comments, questions, or suggestions, particularly concerning potential speakers, please send us an e-mail or come and talk to us.

See ya,

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If you have comments, questions, or suggestions, particularly concerning potential speakers, please send us an e-mail or come and talk to us.

See ya,

Frank and Plümi

PS: our warm regards go out to the co-founder and former co-organizer of the MPI Physics Journal Club, Tilman Plehn.



Disclaimer:

Of course, this is just a shameless knock-off of the CERN PhenClub.

We even stole the page layout from them, so if you don't like it please address your criticisms to Sabine Kraml.

Resumé

*CERN is one of very few places where **PhenClub** concept works*

- many young independent scientists*
- lots of expertise in many different fields*
- (almost) no other duties than research*
- many short-, mid-, long-term visitors*
- experiment and theory*

Communication extremely important to maximize gain from LHC

So finally...

Congratulations!

