



# RESEARCH METHODOLOGY

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# A CASE OF POOR REFEREEING

## ➤ Alan Sokal's hoax

- Not really about Physics but about Cultural Studies
- Sokal wrote a hoax paper in the journal "Social Text"
  - **"Transgressing the boundaries: Toward a transformative hermeneutics of quantum gravity"**
- Passed by editors (not referees) who did not recognize the nonsense
- Sokal revealed the hoax in another article very soon
- Purpose was to draw attention to a decline of standards in the academia
- Ultimately, did not prove very much
- See Weinberg's article on Sokal's hoax for a discussion

# REALLY POOR REFEREEING

- **Bogdanoff Brothers**
  - Igor and Grichka – comedian twins in France with their television show
- Published five papers in physics journals
- Got PhDs using these papers
- Thesis does not make sense to most (all?) experts
- Papers are even more strangely written
- A hoax like the one by Sokal?

# BOGDANOFF AFFAIR

- Story broke in Oct 2002
  - Did the brothers play a hoax on the Theoretical Physics community?
  - Some people thought so, Bogdanoffs denied it
- Papers were in respectable journals
  - Classical and Quantum Gravity (2001)
  - Annals of Physics (2002)
  - Nuovo Cimento (2002)
  - Czechoslovak Journal of Physics (2001)
  - Chinese Journal of Physics (2002)

# BOGDANOFF AFFAIR

- The papers used actual jargon from theoretical and mathematical physics
  - but made no sense either as physics or mathematics
- “Now, the topological field theory (for  $D = 4$ ) is established when the Hamiltonian (or the Lagrangian) of the system is  $H = 0$ , such that the theory is independent of the underlying metric.” (Correct)
- “**Definition 1.2.** A theory is topological if (the Lagrangian  $L$  being non-trivial) it does not depend on  $L$ .”
- “Definition 1.2 means that  $L$  is a topological invariant of the form  $L = R \wedge R^*$ .”
- $Z = \text{Tr}(-1)^n e^{-\beta H}$  for partition function –  $n$  makes no sense
- Paper uses more technical jargon, but remains nonsensical

# BOGDANOFF AFFAIR

- “As an example, we consider Foucault’s pendulum experiment  $\mathcal{F}$ , which cannot be explained satisfactorily in either classical or relativistic mechanics.”
- This is a completely incorrect statement
- *“Whatever the orientation in physical space of the plane of oscillation of the pendulum, this 2-dimensional plane necessarily intersects the initial singularity  $S$ ”*
- **Meaning:** Since the big bang happened everywhere, no matter which way a pendulum swings, the plane in which it swings can be said to “intersect the big bang”.
- **Or:** No matter which way a pendulum swings, there is some point on the plane of its motion.
- **Or:** Any plane contains a point.

# BOGDANOFF AFFAIR

- Three other papers were nearly identical and extracts of the CQG paper
  - Annals of Physics, Nuovo Cimento, Chinese Journal of Physics
- Igor Bogdanoff's thesis included these papers joined together
- Their supervisor, Daniel Sternheimer, is a well known mathematical physicist
- Thesis examiners included R. Jackiw, S. Majid, I. Anotniadis
- Jackiw defended the thesis
- Antoniadis reversed his judgement later
- Majid said that he had passed it, but his comments were not positive

# BOGDANOFF AFFAIR

- None of these physicists was the type to play a prank
- They failed to discharge their duties
- Bogdanoffs did not understand what they were writing
- But had some idea of the jargon
- Then they selectively quoted comments/reports on their work
- The journals were embarrassed
- Some ethical issues were highlighted



# IMPACT OF RESEARCH

- Social Impact of discoveries and inventions
- Important for jobs, promotions, awards
- Bibliometrics: measuring impact of research
- Citation analysis (Google scholar, Web of Science, INSPIRE-HEP ...)
  - No resource is complete
- h-index: N papers with N or more citations ( $h = \text{Hirsch}$ )
- Altmetrics