

# The Galileo Project: What Worked, What Didn't

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Loaded Metals  
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# Historical Context

## **BIG QUESTIONS:**

1. 17-years later, science or pseudoscience?
2. Were F&P right or wrong?
3. Were the science authorities right or wrong?

## **CIRCUMSTANCES:**

1. Nearly all prior objections: Resolved
2. Current dominant objection: Irreproducibility
3. Scientific atmosphere: hostility, high stakes

# The SPAWAR Claims

- 1. *Simple***
- 2. *Unambiguous***
- 3. *Portable***
- 4. *Highly repeatable***
- 5. *Permanent***

# Challenge to the Claims

<b>1. <i>Simple</i></b> <i>(Exp/Analysis)</i>	<b>YES/NO</b>
<b>2. <i>Unambiguous</i></b>	<b>NO</b>
<b>3. <i>Portable</i></b>	<b>YES</b>
<b>4. <i>Highly repeatable</i></b>	<b>YES</b>
<b>5. <i>Permanent</i></b>	<b>YES</b>

# Guidance

1. **Harry M. Collins: “Changing Order”**
2. **Taleyarkhan: How not to attempt replication**
3. **Fleischmann and Pons 1989: How to hinder replication**

# A Borrowed Strategy

**Software Industry: Alpha and Beta testers**

- **F&P: Provide poor instructions to the entire world, quickly**
- **Galileo Project: Create detailed protocol, deploy strategically**

# The Galileo Project Team

- 8 Teams (2 Alpha, 6 Beta)
- 3 Advisors
- 3 Countries: U.S., India, Netherlands
- 34 People total
  
- As of this conference, 4 replication teams will have reported to the scientific community
  
- Journal papers in progress
- Misinformation: “NET to announce results of TGP”  
No “Science by Press Release (or Web site)”

# Team Member Qualifications

- **“Science students from the undergraduate level up”**
- **Access to the required laboratory equipment**

**“Skilled in the Art”**



# Initial Response to Results

- **Polarized response to initial apparently positive results:**
  - A) Seek better ways to confirm nuclear characteristics
  - B) Seek alternative ways to disconfirm nuclear claim
- **Disconfirmation Attempts**
  - A) Highly speculative explanations
  - B) Failed to consider 3D track geometry

# **Fear, Uncertainty, Doubt**

- **Distracting**
- **Time-consuming**
- **Demoralizing**

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**FEAR: Not an over-dramatizaion!**

- A) Reprimand for "inappropriate research" by employer**
- B) Job and consequently career threatened**
- C) Denied access to lab equipment**
- D) Prohibited from being co-author on accepted paper in peer-reviewed journal**  
**(This is nothing new, but still, 18 years later?)**

# Open Invitation ?

- **Choose people who want it to be a success**
- **Stakeholders**
- **Track record of demonstrated interest in positive outcome**

# **Facilitate Group Communication**

- 1. Development of the Lab Protocol**
- 2. Internet discussion list**
- 3. Telephone science conferences**



# The Galileo Project Lab Protocol

- **Version 1: (Pam's) 2 pages of text, separate photos**
- **Version 2: (TGP team) 35 pages, integrated photos, diagrams, materials and parts list, supplemental videotape**

**(All but one team follow the lab protocol at the beginning)**

# Internet Discussion List

## **GOOD FOR :**

- Simple questions
- Basic instructions

## **BAD FOR PRESENTATION OF RESULTS:**

- Poorly-described
- Incomplete presentations
- Poor tracking and threading
- Poor accountability
- Poor comprehension



# Telephone Science Conferences

## **SETUP**

- **Deadlines for abstracts**
- **Advance electronic distribution**
- **Structured session**

## **BENEFITS**

- **Low cost**
  - **Quick setup**
  - **Real-time discussion**
  - **Wider bandwidth communication**
  - **Historical record**
  - **Level playing field**
- (Only one team declined to participate)**

# First Challenge: CR-39 Materials Issue

**New ground - no textbooks - few experts**

1. **CR-39 designed for air/vacuum**
2. **All CR-39 not created equal**
3. **TASL brand: All fogged**
4. **Landauer/Fukuvi brand: Generally clear**

# Chemical Attack Issue

## **Critical assertions:**

- 1. All CR-39 is equal**
- 2. Fogged results at UCB/SRI = SPAWAR**
- 3. Chlorine and oxygen reaction**

## **Shift from “wet” to “dry” experiments**

- 1. Isolated chemistry**
- 2. Blocked 90% of apparent alphas**
- 3. Killed most of the subsequent results**
- 4. Results of most wet experiments still pending, not yet effectively analyzed.**

# Other Challenges

- 1. Delay in sharing the backside track and apparent neutron observation from SPAWAR**
- 2. Gold cathode stimulates proton recoil effect**
  - Silver cathode kills proton recoil effect**
  - Lab protocol designed to use silver cathode**
- 3. Effects are created w-w/o external fields with Au, Ag, Pt**
  - With Ni, effects are not created without external field**
  - This was not known prior to the start of TGP**

# What's Next

- **Improve characterization of “success”**
- **Utilize better analytical tools and process**

# Appreciation

- **Galileo Project Team Members**
- **New Energy Institute Sponsors**
- **Skeptics**
- **CMNS Community**

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