

## **2003 Nicholson Medal Citation:**

**“For....initiatives on behalf of female physicists ....”**

**Problem: WHAT initiatives?**

**Today: First step...try to discover something interesting.**

**“why” questions always interesting to physicists. Hence**

**“WHY ARE THERE SO FEW WOMEN IN PHYSICS?”**

**Attack plan --- Three Questions:**

**1. What is the question?**

**2. Why care about this question?**

**3. What can we do?**

**We = much help from many of both sexes, especially: Barbosa,Carbone,Dyer,Rachel Stanley, & 14 female Ph.D. students: Herzfeld, Bansil, Djordjevic, Amitrano, Selinger, Araujo, Glotzer, Prakash, Johow, Prakash, La Nave, Yamada, Skibinsky, Xu . And 6 Research Associates:Ditzian-Kadanoff, Shore, Ossadnik, Kitaoka, Urbanc, Braunstein**

**QUESTION 1: What is the question?**

**“Why are there so few women in physics?”**

**Why ask this question?**

**Probability to solve a problem increases if we understand causes**

**Example: why do so many have high blood pressure?**

**Answers: cholesterol, exercise, weight, smoking, .....**

**ANSWER LEADS TO SOLUTION !!**

**Solution methods: collaborations among many, including those without high blood pressure**

**Similarly, solution to why so few women requires collaboration among many, including those who are not women!**

## QUESTION 2: Why care about this question?

### 1) **“Non-practical reason”**: right vs wrong (civil rights)

How society got this way?

What prevents ability from being utilized? (law/med/..)

### 2) **“Practical reasons”**:

Progress at half speed, if half the available talent excluded

More efficient society if each human uses his/her talents  
(woman excluded from physics might do XX for which she is less talented)

Money taxpayer paid for woman's education

### 3) **“Selfish” reasons**: we all care about AIDS because we all know someone afflicted with AIDS. Similarly we should care to ask “Why so few women” because we all know a female who might choose physics (niece, daughter, neighbor, ...)

### **QUESTION 3: WHAT TO DO (to understand why so few women)?**

**To answer a science question, encourage anyone who wishes to hypothesize, then discuss/test/refute viable hypotheses**

**Can we do same for the question why so few women?**

#### **WHERE TO START?**

**Answer 1: GOOGLE “Women in Physics” →2M hits**

**“Women in Physics Canada” →200K hits**

**First impression: Universality (all countries, ....)**

**Second impression: Treat Symptoms (not understand causes)**

**Answer 2: Discuss with colleagues:**

**First reaction: Why is a man interested in **why so few women?****

**Second reaction: Problem is being solved already...**

**Third reaction: There cannot be an answer to a “WHY” question**

## **POSSIBLE HYPOTHESES (not mutually exclusive)...**

**But FIRST** some **“constraints”** (clues,...)

1. Countries **differ** in fraction of Ph.D., but **similar** 20 years later
2. “Women who **quit** performed as well as men who **did not quit**”
3. Hypothesis must explain why fewer women in physics than in other fields (medicine, law, bio, chem, even math)
4. Civil rights analogy is too glib (but **“way of life”** threatened)
5. Not **brain** related, **hard work** related (women work harder), ...
6. Not **solely** due to lack of role models (role models partially backfire: because there exist some successful women, some men say “problem solved”)

## **HYPOTHESIS 1: “Women Physicists Speak”** [www.aip.org/statistics](http://www.aip.org/statistics)

Support of **parents/partners/advisors/teachers/colleagues/.....**

Probability of all 5 supports:  $p_1 p_2 p_3 p_4 p_5 \ll 1$

For each of the 5 supports:  $p_j(\text{physics}) < p_j(X)$ ,

where  $X = \text{medicine, law, bio, chemistry, oceanography, .....}$

**Why?** Support givers assume that physics requires some “magic talent”

(cf. opera, basketball, composing, painting, ....)

## **HYPOTHESIS 2:**

**Physics Today March 04: B.L. Whitten**

**WHY a **chilly climate** in physics more than other fields?**

**Are physics departments less tolerant of:**

- 1. People who make really “**stupid**” mistakes**
- 2. People who have really “**trivial**” ideas**
- 3. People who seem too “**broad/unfocused**” (too many interests)**
- 4. People with other dedications (ex: babies)**
- 5. People who do not stay overtime at work (ex: child care)**
- 6. People who are not sufficiently **cocky** (who lack self-esteem)**
- 7. People who dress well and/or smell good (**Einstein image**)**

## **HYPOTHESIS 3: Extra challenge of partners and kids**

### **1. PARTNERS. Do women worry that ....**

- a. will be more difficult to find partner if they choose physics?  
68% female physicists marry scientists (but 17% of males)**
- b. will be expected to assume home management responsibilities?**
- c. partner can tolerate physicist's "special needs" (sharp focus, long hours, depression on repeated rejections, ...)**

### **2. KIDS....the BIGGER challenge**

- a. Unclear exactly how much allowance is made for time off, absence days, and lack of clear defn of **time renormalization** (productivity = papers/renormalized time, tenure clock time = renormalized time, etc...but how to define renormalized time?)**
- b. Who has the principal responsibility for kids? Sharing is only an **ideal gas limit**....rarely realized in practice.**
- c. Partner is often "**one more kid**" to have responsibility for...**

**Last Question: WHAT CAN CHANGE PRESENT SITUATION?**

- 0. Admit the fact: Physicists are supposed to be so intelligent, yet finish **last** among the big professions in fraction of women**
- 1. Involve **both** sexes in making progress (cf. civil rights battle)**
- 2. Action will be more clear **if we understand reasons** better**
- 3. Learn from countries with more assistance for women with kids**
- 4. Proofread all written documents by someone who has a **delete key** (and is sensitive to words that hurt)**
- 5. Be very sensitive to what you say, as well as what you write (you cannot use a **delete key** on what you say, and “bad words hurt forever”)**