June 11, 1999
H.J. Frisch

Thoughts on Authorship on Big Experiments

1 The APS Guidelines on Authorship

The APS guidelines on authorship are very clear[1]:

'PUBLICATION AND AUTHORSHIP PRACTICES'
'Authorship should be limited to those who have made a significant contribution to the concept, design, execution and interpretation of the research study. All those who have made significant contributions should be offered the opportunity to be listed as authors. Other individuals who have contributed to the study should be acknowledged, but not identified as authors.'

2 Collaboration Guidelines in HEP

In my experiment, CDF, (which stood originally for the Collider Detector Facility, until it was realized that a Facility was a formally defined object, after which it became the Collider Detector at Fermilab), the 500+ collaborators work under the following guidelines for authorship[2]:

```
0.) Definitions:

        i) "List of Authors" means the names of people to be
        listed on a paper submitted by the CDF Collaboration
        for publication in a scientific journal.

        ii) "Standard Author list" represents a default
        group of people who are to be included in all papers
        for publication with the exception listed below.

1.) Members of the CDF Collaboration become part of the Standard
Author list after they have completed a minimum of 1 FTE-year
of service work in the CDF Collaboration. The definitions
and standards for service work are determined by the Spokespersons
and Project Managers (see appendix A for more specifics).
When the experiment is in operation, Members  on the Standard Author
list must also contribute to the operation of the detector. This
is normally satisfied by taking shifts. The precise
requirements for the contribution to detector operations
is proposed by the CDF Department and is approved by
```

the Executive Board.

2.) Visitors to CDF who make important contributions to one or more papers may be added to the author list for those papers. The Executive Board member from the sponsoring Institution makes the request to the Spokespersons, who then approve this addition. In exceptional circumstances, a long term visitor may be added to the Standard Author list by petition to the Executive Board.

3.) Any person on the List of Authors for a specific publication may request that their name be removed. This request must be transmitted to the Spokespersons and the Analysis Conveners associated with the publication a minimum of three days in advance of the submission of the publication to a journal. Changes to the author list are then transmitted to the CDF Secretary.

4.) The above rules do not apply to the publication of technical information (e.g. design of specific apparatus used on CDF).

5.) The List of Authors for all publications shall be listed alphabetically, sorted by the last name, first name, regardless of institutional affiliation. Institutional affiliation shall be designated by a superscript referring to a list of institutions that follows the list of names on the List of Authors.

6.) Where applicable, the editorial constraints of a specific journal may supersede item 5.) In this case, a negotiated format for publication will be employed. The CDF Spokespersons, or their representatives, are authorized to negotiate any format changes to the List of Authors.

7.) The list of authors shall be updated twice a year - once in January and once in July. It is the responsibility of the Executive Board member representing each institution to provide an accurate and current list of members to be included on the author list. In extraordinary cases, upon the request of a Collaboration member, additions to the author list may be considered between these updates by the Executive Board.

8.) A person who ceases to be a CDF Member will have his/her name included on publications for one year after their membership has ended, unless the Executive Board decides otherwise.

```
Appendix A

Specific requirements of service work in the period 1995-2001:

Authors on Run II papers must put in a minimum of 1 FTE-year
of service work on CDF.  "Service work" is defined by the
Spokespersons and Upgrade Project Managers.
```

While the details vary from big High Energy collaboration to collaboration, many of the features are the same: the default is that all physicists who have devoted more than some threshold time are authors, the listing is alphabetical or some democratic variant thereof (some collaborations make exceptions for graduate student theses, for example, or rotate the starting point), and no active role of any kind has to be taken to put one's name on a given paper once one is on the list. Moreover one's name typically lingers on the author list (and hence appears on subsequent papers) after one has stopped active participation in the science.

3 The Difficult Issues

The juxtaposition of these two sets of guidelines, both done in good faith and with high principles, seems startling to those who don't work in my field. Why are they so different?

These issues have been debated inside most big collaborations, and I can give a sample of the arguments that are made in the favor of the present policy. At this point I should confess that I have long felt that these arguments are flawed, and there is a better way that achieves the same, laudable, goals. I'm consequently not an unbiased presenter, but will try to be fair. The arguments are:

- Young physicists working hard on the nitty-gritty detector details (often hardware, in the parlance of the field, but lately increasingly complex software) will get no credit, while more aggressive and less principled folk will 'skim the cream' by preparing the analyses while waiting for the detector to be built and commissioned so that they can jump on the data.

- There is a type of physicist who understands the care and planning that it takes to get first-rate data. These are often 'instrument-builders'; people without whom the experiment would not happen. In some cases they are the originators of crucial ideas (for example, the silicon vertex detector at CDF was critical to our discovering the top quark), and have followed those ideas through to fruition. They are often by nature self-effacing and independent, and would not put their names on papers written by others, even those that depend critically on their work.

- It is difficult and painful to decide who among 500+ authors is deserving and who isn't; spokespeople have too much to do as it is, and it could occupy a large number of people arbitrating disputes for priority and credit. It is much easier to have a uniform policy, with clearly defined rather mechanical guidelines.

There is some truth in all these arguments.

4 Hard-nosed Realities

However, I believe that these arguments are in fact not solid. They are based on some unwritten assumptions:

- Having one's name listed on a paper with hundreds of authors has an impact on getting a job in a university physics department.
- Physicists can do sophisticated analyses without understanding the detector.
- Getting credit for what you actually do will carry less weight than assigning equal credit to everybody for everything.
- The 'instrument-builders' benefit from credit they get from being authors on all papers from the collaboration.

I think every one of these arguments is debatable, at the least. A short list of papers that one has actually written carries much more weight than 5 pages of titles all attributed to A. Aardvark et al. Those who try to 'skim' have a huge disadvantage compared to someone intimate with the detector and the data. And many of the 'instrument-builders' are recognized for what they do, and give talks and write papers on their contributions. Many are at National Labs, where publishing is not as critical as for junior faculty. Most are internationally known and are highly respected. Adding their names to papers they know nothing about does not increase this respect.

5 Reconciling with the APS Principles

One of the most important words in the APS guidelines is the 'and' in the phrase 'significant contribution to the concept, design, execution **and** interpretation of the research study.' There is a subtlety as well in the phrase 'research study': is this just the analysis described in the paper, or the project itself? CDF has been going on for more than 25 years now, and so to ask young physicists to have contributed significantly to the 'concept' of the original detector is not reasonable. So what is the research study?

But the 'and' cuts the other way: the present policy means that papers are published with authors who do not even know the existence of the paper and its contents. The default is that the names appear unless someone requests his or her name be deleted. It is hard to keep up with the avalanche of papers covering an enormous range of topics in HEP: diffraction, QCD, W and Z physics, the top quark, the myriad details of b-quark decays, charm production, low-x physics, etc. Most papers are read by only a few of the authors.

I believe that this violates the spirit of the APS guidelines, and that the time has come for High Energy Physics to change. This will have to happen in any case, because the present default is unworkable for the huge collaborations in the LHC (in fact discussions on how to proceed are going on inside these collaborations.)

6 One Possible Solution

One possible [3] solution is, after the collaboration has become old enough such that many of the eligible authors joined after the design and construction of the detector [4], to change the default of having all eligible authors' names on all papers. Instead one could start with only those who have taken part in the specific analysis. All eligible authors who acknowledge having read the paper are welcome to put their names on it. This doesn't change the eligibility requirement, but ensures that authors know the existence of the paper (certainly a minimum as a requirement), and have read it. One could go further and specifically cite the APS guidelines, and request collaborators feel comfortable with the guidelines in each case to request their names be added. In either of these scenarios the honor system would be used; all requests from eligible collaborators would be honored.

I believe that having authorship mean what it was intended will help rather than hurt young folk. These are very hard problems: high energy physics has evolved rapidly into these huge collaborations of immensely talented driven young physicists, with a benign management structure of the scientific output itself (as opposed to fiscal management, which is tightly run). I hope physicists in other fields aren't too critical; the problems are different, and inside the field the conventions are understood. But I think the present policy isn't serving well the very people it was intended to protect.

7 Acknowledgements

I have benefited greatly from conversations with Steve Mrenna, Jack Sandweiss, and George Trilling. The opinions are my own, however, and slings and arrows should come at me alone. There may be better solutions: constructive suggestions would be appreciated.

References

[1] The APS guidelines can be found on the APS page on Professional Conduct, at http://www.aps.org/conduct.html.

[2] From the CDF bylaws, available on: http://ncdf12.fnal.gov/CDFbylaws/spokes.html.

[3] This solution may not be workable in the huge international collaborations at the LHC where national issues also intrude (I thank George Trilling for pointing

this out). But for 'medium-size' collaborations of 500 people or less I believe it will work well, based on my experience in CDF. It's worth a try.

[4] The problem changes over the life of a collaboration, and even over the life of a 'run', the periodic taking of data. It is unlikely that there is one solution for all situations; what we are discussing here is the 'default' solution for an experiment long after data-taking, the average situation, unfortunately, at CDF.