Regional, Age and Gender Demographics in the ATLAS Collaboration

Luis R Flores Castillo, for the ATLAS Collaboration
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Aspects of demographics and diversity in ATLAS

• In particular the relative fraction of women

• From various demographic perspectives

• Share of contributions to, and recognition by, ATLAS
Founded in 1992
Goal: construct & operate the ATLAS detector @ LHC

~5,300 members
(May 2016)
Nationalities from 94 countries

Of them, ~3,000 scientific authors:
From 182 member institutions in 38 countries
Diverse in age, gender, sexual orientation, gender identity, culture, physical ability, ethnicity, appearance, religion background.

Study group on Diversity established in 2015.

Goals:
• Assess diversity
• Make recommendations to best support it
• Collected data on demographics, participation, leadership filling, recognition of contributions
Snapshots as of Spring 2016 + updated plots

Correlations of world region & gender with:
- Contribution to ATLAS
- Leadership
- Recognition

The role of women in Physics has been studied extensively; hopefully, these data will contribute...
ATLAS Composition

Basic demographic information
• mostly provided by members when joining
• Institution, self-declared info on gender (with only M/F available), date of birth, profession, nationality

Augmented by DB’s with member contributions, technical & leadership roles, recognitions

Explored for correlations with gender & regional distributions

May 2016: 5,300 ATLAS members
Complete DB info: 5,060 members. This is the set used.
4,102 men, 958 women (19%).
From ATLAS administrative DB. Each member in one category.

- Largest: "physicists" with PhD or equivalent; **44%**
- Second: Doctoral or masters students ("students", **36%**)

**Fraction of women varies significantly**

- Largest: admin support staff, **(62%)**
- **22-27%** (non-engineering) students
- **17%** of physicists
- **~10%** among engineers and technicians

<table>
<thead>
<tr>
<th>Profession</th>
<th>Number of people (fraction)</th>
<th>Fraction of women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicist</td>
<td>2,237 (44%)</td>
<td>17±1</td>
</tr>
<tr>
<td>Physics PhD student</td>
<td>1,080 (21%)</td>
<td>24±1</td>
</tr>
<tr>
<td>Physics master/diploma student</td>
<td>443 (9%)</td>
<td>22±2</td>
</tr>
<tr>
<td>Summer/undergraduate student</td>
<td>234 (5%)</td>
<td>27±3</td>
</tr>
<tr>
<td>Engineering student</td>
<td>67 (1.3%)</td>
<td>12±4</td>
</tr>
<tr>
<td>Engineer</td>
<td>711 (14%)</td>
<td>10±1</td>
</tr>
<tr>
<td>Technician</td>
<td>210 (4%)</td>
<td>7±2</td>
</tr>
<tr>
<td>Administrative support</td>
<td>78 (1.5%)</td>
<td>62±5</td>
</tr>
</tbody>
</table>
Age of ATLAS members

Members’ ages span over seven decades
~ half (2,483) < 35 yo

Fraction of women vs age:
• Largest: age < 25 (~ 25%)
• For age ≥ 65, it falls to ~ 10%
• Age ≤ 35: 23±1 (%)
• Age ≥ 35: 15±1 (%)
Mainly physicists and doctoral students

Fewer below 25 yo
• Undergraduate & masters students normally are not authors

Fraction of women: 20%
• Decreases with age as for all ATLAS members
38 countries with member institutions; green: at least one ATLAS member
### Regions:

- **assigned by home institution** (not nationality, residence, whether based at CERN)
- **ad-hoc definitions** (by proximity & to have sufficiently large memberships to discern correlations):

<table>
<thead>
<tr>
<th>Region</th>
<th>Countries</th>
</tr>
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<tbody>
<tr>
<td>Asia</td>
<td>Armenia, Azerbaijan, China, Georgia, Japan, Taiwan</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>Belarus, Czech Republic, Poland, Romania, Russia (including JINR Dubna), Serbia, Slovakia, Slovenia</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>France, Greece, Israel, Italy, Portugal, Spain, Turkey, Morocco</td>
</tr>
<tr>
<td>North America</td>
<td>Canada, USA</td>
</tr>
<tr>
<td>Northern Europe</td>
<td>Austria, Denmark, Germany, the Netherlands, Norway, Sweden, Switzerland (including CERN), UK</td>
</tr>
<tr>
<td>Southern Hemisphere</td>
<td>Argentina, Australia, Brazil, Chile, Colombia, South Africa</td>
</tr>
</tbody>
</table>
Fraction of women: 12 to 23%
Lowest: Asia; highest: Mediterranean, North America, Northern Europe
Larger amongst younger members in all regions
Larger amongst younger members in all regions (plot: 2016 data)
Leadership positions

Many within ATLAS:

@ {senior, junior levels} ⊗ {design, build, operate ATLAS; analyze & interpret ATLAS data}.

Leadership roles’ 7 categories:

• “Top level management”: spokesperson, 2 deputies, technical & resource coordinators.
• “Major area coordinators” of detectors (9) or activities (5).
• Institution Team Leaders 225 Team Leaders, 44 are women.
• Physics Coordination area: 15 groups. Each convened by 2 people.
• Trigger, Data Preparation, Computing. Since 2009, 223 in T, 101 in DP, 113 in C&SW.
• Subgroups of the 15 Physics Coordination groups: ~ 5 each, each convened by 2 people.
• Two large committees:
  Publications Committee: publication process, 12 members.
  Speakers Committee: allocate talks to ATLAS members, 15 members.
Leadership roles in ATLAS, ordered ~ level of responsibility. Speakers Committee has a fraction of women larger than average.
Executive Board

Main body steering ATLAS

- Chair: spokesperson.
- Deputy chair: Technical Coordinator.
- Members:
  Top Level Management + Major Area Coordinators + chair of PubCom + 3 members at large

Fraction of EB affiliated with CERN: ~5% (excluded from next plot):

- > any region.
- Expected from CERN’s special role in ATLAS operation; CERN staff resident in area, lower personal & prof constraints (some leadership positions require residency @ CERN).
- Technical & Resource coordinators are formally requested to be CERN staff members.
Members affiliated with CERN excluded (~ 5%)  
None from Southern Hemisphere, but 95%CL upper limit is consistent with avg.
Contributions & talks

Talks on behalf of ATLAS are allocated by the Speakers Comm. Large # ATLAS members —> significant # able to give any particular talk. Procedure designed to be equitable.

Suitability:
• Number & priority of talk nominations (by institute Team Leaders + Major Area coordinators)
• Time contributed to the successful operation of the experiment
• Current need for professional advancement
• How long since last talk

For analysis: only physicists & physics PhD students (because only ATLAS public talks on physics were considered).
Contributions & talks

- Number of nominations for women ≈ men
- From Physics Coordination (PC):
  fraction of men with 0 (no nomination) > for women.
  On average, women receive stronger nominations
Operational tasks

Time recorded in a DB

FTE (Full Time Equivalent) contributed in the last 4 years

No statistical difference between men and women
International talks

Fraction of men and women with at least 1 international talk since 2010. Only contributors to operational aspects:

<table>
<thead>
<tr>
<th>Selection</th>
<th>time as ATLAS author</th>
<th>Fraction of men (%)</th>
<th>Fraction of women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicist</td>
<td>2–7 years</td>
<td>83 ± 3</td>
<td>91 ± 4</td>
</tr>
<tr>
<td>Physicist</td>
<td>7–15 years</td>
<td>81 ± 2</td>
<td>94 ± 3</td>
</tr>
<tr>
<td>Physicist</td>
<td>&gt; 15 years</td>
<td>55 ± 4</td>
<td>77 ± 8</td>
</tr>
<tr>
<td>Student</td>
<td>&gt; 2 years</td>
<td>62 ± 5</td>
<td>57 ± 8</td>
</tr>
</tbody>
</table>

• Women tend to be given relatively more talks than men,
• Especially members with over 15y with ATLAS.
• For students, ~ same between men and women.
• Similar trend for talks in the last 3 y.

Due at least in part to the stronger nominations by the ATLAS’ Physics Coordination
Fraction of physicists who have given at least one talk on behalf of the ATLAS Collaboration since 2009 versus the world region.
ATLAS Overview Week

Week-long collaboration meetings, 3 times/y.

Plenary talks given by members playing key roles in the relevant areas; a form of recognition.

Time evolution of plenary talks:

Increasing fraction of women speakers with time.

Recently consistent with avg. fraction of women in ATLAS (19%)
ATLAS Overview Week

ATLAS Preliminary
July 2018

Fraction of talks

Female presenters
Male presenters

ATLAS Weeks in year
Final comments

• ATLAS has collaborators with over 90 nationalities, ~ 20% women.

• The fraction of women declines with increasing age
  • Slow & steady increase of women’s participation in Physics & Engineering, “Leaky pipeline” (continuous loss of women as they climb the career ladder), or combination?
  • The reason could not be determined with the information available

• At this level of scrutiny, data indicate that ATLAS is engaging women in leadership and recognizing their contributions in a manner proportional to men.

• Similar level of equity in recognition through allocation of conference talks

• World regions representation in leadership and recognition ~ proportional to # members from each region

• Results available at http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PUBNOTES/ATL-GEN-PUB-2016-001/
Leadership roles’ 7 categories:

• **“Top level management”**: spokesperson, 2 deputies, technical coordinator, resource coordinator. 2y terms. SP renewable once. The ATLAS Collaboration Board (1 rep per member state) elects the sp, endorses deps and c’s.

• **“Major area coordinators”** of detectors (9) or activities (5). Term: 2y (detectors+upgrade) or 1y. Coordinate 10s-100s of people. Selection: activity c’s: CB elects from a list from a search committee; detectors: within subsystems.

• **Institution Team Leaders** (182 ATLAS member institutions). 225 TL’s, 44 are women. Selected within institution; no coherent scheme.

• **Physics Coordination area**: 9 PAG’s, 6 CPG’s. Each convened by 2 people, staggered 2y terms. Selection: Phys coord w/help from a search committee.


• **Each PA & CP groups**: ~ 5 subgroups. Each convened by 2 people, 1y term. Convene 10s-100s. Selected by group conveners.

• **Two large committees**:  
  - **Publications Committee**: publication process, 12 members, 2y term,  
  - **Speakers Committee**: allocate talks to ATLAS members; ~800 talks/y; 15 members, 3y term. Selection: general nominations, search committee, elected or endorsed by CB.