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# Early Career Researchers At Work: Working In a Large Physics Collaboration

Amber L. Stuver

Caltech at the LIGO Livingston Observatory

and

The Louisiana State University

[stuver@ligo-la.caltech.edu](mailto:stuver@ligo-la.caltech.edu)

# My Background

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- | M.Ed. physics (2001), Ph.D. physics (2006), from Penn State
- | Research:
  - » Primary: detection of gravitational waves (data analysis)
  - » Secondary: physics education
- | Dual appointment (non-tenure):
  - » Data Analysis & EPO Scientist at LIGO Livingston Observatory (Caltech)
  - » Instructor at the Louisiana State University
- | Primary research performed within a large collaboration
  - » 800+ authors (alphabetical)
  - » 60+ institutions within USA and worldwide

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## Search for gravitational waves from binary black hole inspiral, merger, and ringdown in LIGO-Virgo data from 2009–2010

J. Aasi,<sup>1</sup> J. Abadie,<sup>1</sup> B. P. Abbott,<sup>1</sup> R. Abbott,<sup>1</sup> T. D. Abbott,<sup>2</sup> M. Abernathy,<sup>3</sup> T. Accadia,<sup>4</sup> F. Acernese,<sup>5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000</sup>

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D. L. Kinzel,<sup>1</sup> J. S. Kissel,<sup>23</sup> S. Klimentov,<sup>15</sup> J. Kline,<sup>13</sup> K. Kokeyama,<sup>46</sup> V. Kondrashov,<sup>1</sup> S. Koranda,<sup>13</sup> W. Z. Korth,<sup>1</sup> I. Kowalska,<sup>27b</sup> D. Kozak,<sup>1</sup> V. Krings,<sup>9,10</sup> B. Krishnan,<sup>19</sup> A. Królak,<sup>27a,27c</sup> G. Kuehn,<sup>9,10</sup> P. Kumar,<sup>22</sup> R. Kumar,<sup>3</sup> R. Kurdyumov,<sup>26</sup> P. Kwee,<sup>23</sup> P. K. Lam,<sup>54</sup> M. Landry,<sup>17</sup> A. Langley,<sup>65</sup> B. Lantz,<sup>26</sup> M. Lastzka,<sup>9,10</sup> C. Lawrie,<sup>3</sup> A. Lazzarini,<sup>1</sup> A. Le Roux,<sup>6</sup> P. Leaci,<sup>19</sup> C. H. Lee,<sup>53</sup> H. K. Lee,<sup>81</sup> H. M. Lee,<sup>9,10</sup> L. R. Leong,<sup>9,10</sup> L. Leonor,<sup>40</sup> N. Leroy,<sup>21a</sup> N. Lelandre,<sup>4</sup> V. Lhuillier,<sup>17</sup> J. Li,<sup>46</sup> T. G. F. Li,<sup>11a</sup> P. E. Lindquist,<sup>1</sup> V. Livine,<sup>1</sup> Y. Liu,<sup>46</sup> Z. Liu,<sup>15</sup> N. A. Lockerbie,<sup>83</sup> D. Lodhia,<sup>18</sup> J. Logue,<sup>6</sup> M. Lorenzini,<sup>39a</sup> V. Loriette,<sup>31b</sup> M. Lormand,<sup>6</sup> G. Losurdo,<sup>30a</sup> J. Lough,<sup>22</sup> M. Lubinski,<sup>17</sup> H. Lück,<sup>9,10</sup> A. P. Lundgren,<sup>9,10</sup> J. MacArthur,<sup>3</sup> E. Macdonald,<sup>3</sup> B. Machenschalk,<sup>9,10</sup> M. MacInnis,<sup>23</sup> D. M. Macleod,<sup>7</sup> M. Mageswaran,<sup>1</sup> K. Mailand,<sup>1</sup> E. Majorana,<sup>16a</sup> I. Maksimovic,<sup>31b</sup> V. Malvezzi,<sup>57a</sup> N. Man,<sup>35a</sup> I. Mandel,<sup>18</sup> V. Mandic,<sup>61</sup> M. Mantovani,<sup>14a</sup> F. Marchesoni,<sup>38a,38c</sup> F. Marion,<sup>4</sup> S. Márka,<sup>25</sup> Z. Márka,<sup>25</sup> A. Markosyan,<sup>26</sup> E. Maroc,<sup>1</sup> J. Marquet,<sup>21</sup> F. Martelli,<sup>30a,30b</sup> I. W. Martin,<sup>3</sup> R. M. Martin,<sup>15</sup> J. N. Marx,<sup>1</sup> K. Mason,<sup>23</sup> A. Masserot,<sup>4</sup> F. Matichard,<sup>23</sup> L. Matone,<sup>25</sup> R. A. Matzner,<sup>84</sup> N. Mavalvala,<sup>23</sup> G. Mazzolo,<sup>9,10</sup> R. McCarthy,<sup>17</sup> D. E. McClelland,<sup>59</sup> S. C. McGuire,<sup>15</sup> G. McIntyre,<sup>1</sup> J. McIver,<sup>44</sup> G. D. Meadors,<sup>47</sup> M. Mehmet,<sup>9,10</sup> T. Meier,<sup>10,9</sup> A. Melatos,<sup>56</sup> A. C. Melissinos,<sup>66</sup> G. Mendell,<sup>17</sup> D. F. Menéndez,<sup>34</sup> R. A. Mercer,<sup>13</sup> S. Meshkov,<sup>3</sup> C. Messenger,<sup>7</sup> M. S. Meyer,<sup>6</sup> H. Miao,<sup>51</sup> C. Michel,<sup>36</sup> L. Milano,<sup>5a,5b</sup> J. Miller,<sup>24</sup> Y. Minenko,<sup>57a</sup> C. M. F. Mingarelli,<sup>18</sup> V. P. Mirosfanov,<sup>30</sup> G. Mitselmakher,<sup>15</sup> R. Mittelmann,<sup>23</sup> B. Moe,<sup>13</sup> M. Mohan,<sup>21</sup> S. R. P. Mohapatra,<sup>42</sup> D. Moraru,<sup>17</sup> G. Moreno,<sup>17</sup> N. Morgado,<sup>36</sup> A. Morgin,<sup>57a,57b</sup> T. Mott,<sup>12</sup> S. R. Morris,<sup>28</sup> S. Mosca,<sup>5a,5b</sup> K. Mossavi,<sup>9,10</sup> B. Moura,<sup>4</sup> C. M. Mow-Lowry,<sup>54</sup> C. L. Mueller,<sup>15</sup> G. Mueller,<sup>15</sup> S. Mukherjee,<sup>28</sup> A. Mullahavey,<sup>48,54</sup> H. Müller-Ebhardt,<sup>9,10</sup> J. Munch,<sup>87</sup> D. Murphy,<sup>25</sup> P. G. Murray,<sup>3</sup> A. Mytidis,<sup>15</sup> T. Nash,<sup>1</sup> L. Naticchioni,<sup>16a,16b</sup> V. Nucula,<sup>15</sup> J. Nelson,<sup>3</sup> L. Neri,<sup>38a,38b</sup> G. Newton,<sup>3</sup> T. Nguyen,<sup>54</sup> A. Nishizawa,<sup>12</sup> A. Nitz,<sup>22</sup> F. Nocera,<sup>21</sup> D. Nolting,<sup>6</sup> M. E. Normandin,<sup>28</sup> L. Nuttall,<sup>7</sup> E. Ochsner,<sup>13</sup> J. O'Dell,<sup>7</sup> E. Oelker,<sup>23</sup> G. H. Ogin,<sup>1</sup> J. J. Oh,<sup>88</sup> S. H. Oh,<sup>88</sup> R. G. Oldenhard,<sup>13</sup> B. O'Reilly,<sup>8</sup> R. O'Shaughnessy,<sup>13</sup> C. Osthelder,<sup>1</sup> C. D. Ott,<sup>51</sup> D. J. Ottaway,<sup>47</sup> R. S. Ottens,<sup>15</sup> H. Overmier,<sup>6</sup> B. J. Owen,<sup>14</sup> A. Page,<sup>18</sup> L. Palladino,<sup>57a,57c</sup> C. Palomba,<sup>16a</sup> Y. Pan,<sup>42</sup> C. Pankow,<sup>13</sup> F. Paoleto,<sup>14a,21</sup> R. Paoleto,<sup>14a,21</sup> M. A. Papa,<sup>10,13</sup> M. Parisi,<sup>5a,5b</sup> A. Pasqualetti,<sup>21</sup> R. Passaquies,<sup>14a,21</sup> D. Passuello,<sup>14a</sup> M. Pedraza,<sup>3</sup> S. Penn,<sup>7</sup> A. Perreca,<sup>22</sup> G. Persichetti,<sup>3a,3b</sup> M. Phelps,<sup>1</sup> M. Pichot,<sup>35a</sup> M. Pickenpack,<sup>9,10</sup> E. Piergiovanni,<sup>39a,39b</sup> V. Pierro,<sup>34a</sup> M. Pihlaja,<sup>63</sup> L. Pinard,<sup>37</sup> I. M. Pinto,<sup>54</sup> S. M. Piskun,<sup>11</sup> H. J. Pletsch,<sup>9,10</sup> M. V. Plissi,<sup>1</sup> R. Poggiani,<sup>9,10</sup> J. Pöhl,<sup>9,10</sup> F. Postiglione,<sup>38</sup> C. Poux,<sup>1</sup> M. Prato,<sup>52</sup> V. Predki,<sup>7</sup> T. Prestegard,<sup>10</sup> L. R. Price,<sup>1</sup> M. Prijatelj,<sup>9,10</sup> M. Principe,<sup>5a,8</sup> S. Privitera,<sup>1</sup> R. Prix,<sup>9,10</sup> G. A. Prodi,<sup>64a,64b</sup> L. G. Prokhorov,<sup>30</sup> O. Puntken,<sup>9,10</sup> M. Punturo,<sup>38a</sup> P. Puppato,<sup>16a</sup> V. Quetschke,<sup>28</sup> R. Quitzow-James,<sup>40</sup> F. J. Raab,<sup>17</sup> D. S. Rabeling,<sup>11a,11b</sup> I. Rácz,<sup>61</sup> H. Radkins,<sup>17</sup> P. Raffai,<sup>25,68</sup> M. Rakhmanov,<sup>28</sup> C. Ramet,<sup>6</sup> B. Rankins,<sup>49</sup> P. Rapagnani,<sup>16a,16b</sup> V. Raymond,<sup>66</sup> V. Re,<sup>57a,57b</sup> C. M. Reed,<sup>17</sup> T. Reed,<sup>17</sup> T. Regimbau,<sup>35a</sup> S. Reid,<sup>3</sup> D. H. Reitze,<sup>3</sup> F. Ricci,<sup>16a,16b</sup> R. Riesen,<sup>6</sup> K. Riles,<sup>47</sup> M. Roberts,<sup>26</sup> N. A. Robertson,<sup>13</sup> F. Robinet,<sup>38a</sup> C. Robinson,<sup>7</sup> E. L. Robinson,<sup>19</sup> A. Rocchi,<sup>37a</sup> S. Roddy,<sup>6</sup> C. Rodriguez,<sup>6</sup> M. Rodruck,<sup>17</sup> L. Roland,<sup>4</sup> J. G. Rollins,<sup>1</sup> R. Romano,<sup>5a,5b</sup> J. H. Romie,<sup>6</sup> D. Rosińska,<sup>27c</sup> C. Röver,<sup>9,10</sup> S. Rowan,<sup>3</sup> A. Ridiger,<sup>9,10</sup> P. Ruggi,<sup>21</sup> K. Ryan,<sup>17</sup> F. Salemi,<sup>9,10</sup> I. Sammut,<sup>56</sup> V. Sandberg,<sup>17</sup> S. Sankar,<sup>23</sup> V. Sanmihale,<sup>1</sup> L. Santamaría,<sup>1</sup> I. Santiago-Prieto,<sup>3</sup> G. Santostasi,<sup>90</sup> E. Saracco,<sup>36</sup> B. S. Sathyaprakash,<sup>7</sup> P. R. Saulson,<sup>22</sup> R. L. Savage,<sup>17</sup> R. Schilling,<sup>9,10</sup> R. Schnabel,<sup>9,10</sup> R. M. S. Schofield,<sup>10</sup> B. Schutz,<sup>9,10</sup> B. F. Schutz,<sup>10,7</sup> P. Schwinberg,<sup>17</sup> J. Scott,<sup>3</sup> S. M. Scott,<sup>54</sup> F. Seifert,<sup>17</sup> D. Sellers,<sup>6</sup> D. Sentenac,<sup>21</sup> A. Sergeev,<sup>79</sup> D. A. Shaddock,<sup>54</sup> M. Shalvet,<sup>9,10</sup> B. Shapiro,<sup>23</sup> P. Shawhan,<sup>42</sup> D. H. Shoemaker,<sup>23</sup> T. L. Sidery,<sup>18</sup> X. Siemens,<sup>13</sup> D. Sigg,<sup>17</sup> D. Simakov,<sup>9,10</sup> A. Singer,<sup>11</sup> L. Singer,<sup>1</sup> A. M. Sintes,<sup>43</sup> G. R. Skelton,<sup>13</sup> B. J. J. Slagmolen,<sup>34</sup> J. Slutsky,<sup>48</sup> J. R. Smith,<sup>7</sup> M. R. Smith,<sup>7</sup> R. E. J. E. Smith,<sup>17</sup> N. D. Smith-Lefebvre,<sup>23</sup> G. K. Somiya,<sup>51</sup> B. Sorazu,<sup>57</sup> F. C. Speirits,<sup>13</sup> L. Sperandio,<sup>57a,57b</sup> M. Stefizky,<sup>54</sup> E. Steinert,<sup>17</sup> J. Steinlechner,<sup>9,10</sup> S. Steinlechner,<sup>9,10</sup> S. Steplowski,<sup>17</sup> A. Stochino,<sup>1</sup> R. Stone,<sup>28</sup> K. A. Strain,<sup>3</sup> S. E. Strigin,<sup>30</sup> A. S. Stroeter,<sup>28</sup> R. Strunz,<sup>39a,39b</sup> A. L. Stuver,<sup>6</sup> C. Z. Summerscales,<sup>91</sup> M. Sung,<sup>48</sup> S. Susmithan,<sup>33</sup> P. J. Sutton,<sup>7</sup> B. Swinkels,<sup>21</sup> G. Szeifert,<sup>68</sup> M. Tacca,<sup>1</sup> L. Taffarelli,<sup>64c</sup> D. Talukder,<sup>37</sup> D. B. Tarnes,<sup>15</sup> S. P. Tarabrin,<sup>9,10</sup> R. Taylor,<sup>1</sup> A. A. M. ter Braack,<sup>11a</sup> P. Thomas,<sup>17</sup> K. A. Thorne,<sup>6</sup> K. S. Thorne,<sup>51</sup> E. Thorne,<sup>63</sup> A. Thuring,<sup>10,9</sup> C. Thüsler,<sup>34</sup> K. V. Tokmakov,<sup>63</sup> C. Tomlinson,<sup>60</sup> A. Tonelli,<sup>14a,14b</sup> M. Tonelli,<sup>10</sup> Torre,<sup>14a,14b</sup> C. J. Torres,<sup>28</sup> C. I. Torrie,<sup>13</sup> E. Tournefier,<sup>4</sup> F. Travasso,<sup>38a,38b</sup> G. Traylor,<sup>6</sup> M. Tse,<sup>25</sup> D. Ugolini,<sup>92</sup> H. Vahlbruch,<sup>10,9</sup> G. Vajente,<sup>14a,14b</sup> J. F. J. van den Brand,<sup>11a,11b</sup> C. Van Den Broeck,<sup>11a</sup> S. van der Putten,<sup>11a</sup> A. A. van Veggel,<sup>3</sup> S. Vass,<sup>1</sup> M. Vasuthi,<sup>61</sup> R. Vaulin,<sup>20</sup> M. Vavoulidis,<sup>61a</sup> A. Vecchio,<sup>18</sup> G. Vedovato,<sup>66</sup> J. Veitch,<sup>7</sup> P. J. Veitch,<sup>8</sup> K. Venkateswara,<sup>63</sup> D. Verkindt,<sup>4</sup> F. Vetranò,<sup>39a,39b</sup> A. Vicere,<sup>39a,39b</sup> A. E. Villar,<sup>1</sup> J.-Y. Vinet,<sup>35a</sup> S. Vitale,<sup>11a</sup> H. Vocca,<sup>38a</sup> C. Vorvick,<sup>17</sup> S. P. Vyatchanin,<sup>30</sup> A. Wade,<sup>54</sup> L. Wade,<sup>13</sup> M. Wade,<sup>13</sup> A. J. Waldman,<sup>23</sup> L. Wallace,<sup>9</sup> Y. Wan,<sup>46</sup> M. Wang,<sup>18</sup> X. Wang,<sup>46</sup> A. Warner,<sup>9,10</sup> R. L. Ward,<sup>21</sup> R. M. Was,<sup>31a</sup> M. Weinstein,<sup>9,10</sup> A. J. Weinstein,<sup>1</sup> R. Weiss,<sup>23</sup> T. Welborn,<sup>6</sup> L. Wen,<sup>5,13</sup> P. Wessels,<sup>9,10</sup> M. West,<sup>22</sup> T. Westphal,<sup>9,10</sup> K. Wette,<sup>9,10</sup> J. T. Whelan,<sup>67</sup> S. E. Whitcomb,<sup>133</sup> D. J. White,<sup>60</sup> B. F. Whiting,<sup>15</sup> K. Wiesner,<sup>9,10</sup> C. Wilkinson,<sup>17</sup> P. A. Willems,<sup>1</sup> L. Williams,<sup>15</sup> R. Williams,<sup>15</sup> B. Willke,<sup>9,10</sup> M. Wimmer,<sup>9,10</sup> L. Winkelmann,<sup>9,10</sup>

# Current Research Process

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- | Publishing results using current data necessitates a full author list.
  - » Full author list papers usually take months from the beginning of composition to submission to journal.
  - » Only papers on new methodology (analysis algorithms, calibration, etc.) publish with short author lists.
  
- | Full author list publication process:
  - » In general, use recent data collected with the LIGO detectors and other international detector(s) if concurrently operational.
  - » Specialized search groups apply different techniques and methodologies to search for gravitational waves in noisy data.
  - » Results papers written by groups; sections written by individuals
  - » Drafts are revised several times by the group.
  - » Mature draft sent to publications committee which performs internal peer review and opens paper to comments from the collaboration.

# Group Paper Writing

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- | Many references for results papers have been established.
  - » >70 results papers have been published by the collaboration.
  
- | New references are always added. Examples:
  - » New astrophysical population estimates
  - » New techniques in signal processing
  - » New instrumental techniques
  
- | Write papers and share references using revision control systems (CVS/SVN/Git)
  - » Most of my collaborators are also software developers – we write our papers and share references within the same infrastructure we develop software.

# How I Do My Literature Searches

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- | When performing a literature review, I usually want to know more about how an idea I've had has been explored (or not) in the past:
  - » Find a recent relevant article.
  - » Check “Refers to” listings.
  - » Repeat until originating article found.
  - » Check “Cited by” listings for originating article.
  - » Repeat looking for articles duplicating research I'd like to do.
  
- | Services I frequent:
  - » Arxiv (this is where I *always* start)
  - » NASA ADS
  - » INSPIRE

# Journal Peer Review

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- | After the rigors of developing a publication in the LIGO Scientific Collaboration, I feel very well prepared for the peer review process.
  - » Once full author list papers make it to this stage, it is rare to be rejected.
  - » Short author list papers are also subjected to collaboration review.
  - » Collaboration will also comment on paper's appropriateness for a target journal.
- | This is often where concerns that are not obvious to non-experts in the field come to light.
- | Realistically, the system seems to work well.
  - » Things like turn-around time will always be something we wish could be faster (that is, as a publishing author and not a referee).

# Academic Profiling & Networking

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## I ResearchGate

- » Actively promotes posting full text of journal articles (can see requests for full texts of publications as well)

## I Academia.edu

## I The social networking aspects of these are interesting but not important to me.

- » ResearchGate gives you a score reflecting your “reputation” calculated from your activity on the service.
- » Academia.edu relies more on statistics of profile & article views.

## I INSPIRE-HEPNAMES

- » The ability to associate the variations on my name as belonging to me (as a single person) increases my visibility and impact.
- » I am also listed in the ORCID as 0000-0003-0324-5735.



# Access To Publications

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- | Before my dual appointment, I was over 1,800 miles away from the Caltech's physical library.
  - » If the resource isn't accessible online, it's useless to me.
  - » Electronic archiving of old volumes has been very valuable and markedly better from my days in grad school (1999-2006).
- | Caltech doesn't always have access to education journals that I use to look for references (e.g. *The Physics Teacher* [AAPT]).
  - » I get around this by having access through society membership and affiliation with another institution.
- | Open access publishing model
  - » arXiv makes many publications "open access".
  - » Tenure track peers are concerned about the cost of open access publishing.
  - » Potential to flood the internet with bogus journals (public disservice)

# Suggestions

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- | Anything that increases access to papers, while maintaining integrity, is more than welcome.
  - » This may be even more strongly felt by industrial physicists.
  - » E.g. open access, refers to/cited by cross linking
  
- | Promote the Open Researcher and Contributor Identification (ORCID) system to increase our impact.
  - » That way A. Stuver, A. L. Stuver, and Amber Stuver are all recognized as me.
  
- | Ensure transparency in the reviewing process to preserve trust.
  - » Bogus journals and conferences that collect “open access” fees and publish anything threaten the trust of researchers.

# References

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- | LIGO Scientific Collaboration Publication Policy:
  - » <https://dcc.ligo.org/LIGO-T010168-v6/public>
  
- | LIGO Scientific Collaboration Review Policy:
  - » <https://dcc.ligo.org/LIGO-M060334-v4/public>