Bibliometric analysis

of

UvA and VU Physics.

Faculty of Science, UvA

&

Faculty of Science, VU

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1 Introduction

The objective of this bibliometric analysis is to provide an overview of the publication output and international impact of several institutes of the Faculties of Science of the Vrije Universiteit Amsterdam (VU) and the Universiteit van Amsterdam (UvA) spanning the period 2007 through 2016. This overview is based on a quantitative analysis of peer reviewed articles published in scholarly journals and serials covered by the Science Citation Index (SCI), the Social Science Citation Index (SSCI) and the Arts & Humanities Index (AHCI) of the Thomson Reuters Scientific /Clarivate Analytics in Philadelphia (USA). These three databases are also known as and available on the Web of Science (WoS).

WoS covers about 12.000 peer reviewed journals in all scientific disciplines and this number is still growing. These journals are generally considered the most prestigious, or so-called core journals, of peer reviewed scientific journals (Garfield, 1997). In addition to standard bibliographic details, WoS stores the article's cited reference list. This made the database unique on its own and de facto the world standard for citation analysis. Nowadays more citation-based databases are available (e.g. Scopus, Google Scholar) but for the time being WoS is perceived as the gold standard in the field of bibliometrics.

Thomson Reuters Scientific / Clarivate analytics also produce two analytical databases based on data collected in the SCI, SSCI and AHCI. These are the Journal Citation Reports (JCR), in which they publish the journal Impact Factors (IF) amongst other journal performance indicators. The Essential Science Indicators (ESI) is the other analytical database which provides the world average number of citations of publications for 22 different research areas over the last 10 years and the current year building. These world averages are the so-called baselines for citations by discipline and year. In addition to the world average baselines, the percentile thresholds of which the top decile (10%) and top percentile (1%) of citation impact of papers are the most useful, are also presented in ESI.

In chapter 2 the methods used are explained. Furthermore, in chapter 3 the analysis per department / cluster are presented. And in chapter 4 the used references are given.

This report follows the methodology of “Bibliometric analysis of the Graduate School Experimental Plant Sciences 2008-2013”conducted by the Library of the Wageningen UR.

2 Methods

In this analysis the citation impact of publications of the staff of the Faculties of Science of VU and UvA was investigated. Research articles, reviews, and letters were included in this analysis, because these publication types are most likely to report on substantial research results that have been subjected to peer review.

2.1 Data collection

Publication lists were taken from the research information system from the VU (PURE) and UvA (PURE) for every department or cluster participating in this analysis. In these systems all scientific output from the universities is registered. On a daily basis, registered publications are checked and validated. It is the responsibility of the groups to keep their publication list up-to-date.

The full bibliometric analysis comprises:

Departments of Physics (both VU & UvA)

1. Particle and Astro-Particle Physics (entire IHEF division of IoP + VU section 'Particle and Astro-Particle Physics'; joint VU+UvA unit, integral part of the Nikhef collaboration)
2. Instituut voor Theoretische Fysica Amsterdam (entire ITFA division of IoP; UvA-only unit)
3. Van der Waals-Zeeman Institute (entire WZI division of IoP; UvA-only unit)
4. LaserLaB (VU-only unit; all VU physics LaserLaB groups)

2.2 Citations and self-citations

The number of citations of each publication was harvested from Web of Science in June 2017. There is an ongoing debate on how self-citations should be used in bibliometric analyses. We chose not to correct for self-citations for the following reasons. Firstly, the baselines for world average citations (provided by Thomson Reuters Scientific / Clarivate Analytics) that were used for bench marking are not corrected for self-citations. In the second place, it has been demonstrated that self-citations are an inevitable part of the research process and have no influence on the outcome of bibliometric indicators at the level of department or institute (Glänzel et al., 2006). Thirdly, the self-citation patterns are similar within disciplines (Snyder & Bonzi, 1998). Van Raan (2008) has shown that self-citations have the effect of increasing external citations and thereby an accumulating effect on the total number of citations for research groups.

2.3 Benchmarking

The database Essential Science Indicators (ESI) provides the world average number of citations and percentile thresholds for publications for 22 different research fields. These baselines allow us to benchmark the citation results of the publications against the world average citations for each research field and year. For this, the publications are assigned one of the research fields from the Essential Science Indicators on the basis of the journal in which the article was published. The journal lists are publically available at:

http://ipscience-help.thomsonreuters.com/incitesLiveESI/ESIGroup/overviewESI/esiJournalsList.html .

For publications published in the set of multidisciplinary journals, such as Nature, Science, PNAS, PLoS ONE etc., the assignment to a research field will be done for each publication individually on the basis of the research fields of the references in the article and the title of the article itself. In this way it is possible to establish for each publication of a given year, the world average number of citations and the top decile (10%) and top percentile (1%) most cited publications thresholds in their research field.

For the current analysis we used the baselines retrieved from ESI in June 2017.

2.4 Relative Impact

The relative impact (RI) is the common measure that is used as a proxy for the impact of a publication. The number of citations provides a measure for the impact of the publication to which these citations refer. However, the number of citations to a publication varies considerably across different research fields. For this reason the impact of a publication is normalized by dividing the number of citations to a publication by the world average number of citations for the research field to which the publication belongs. The Relative Impact (RI) for a series of publications is calculated as follows:

$$\mathrm{RI} = \frac{1}{N} \sum_{i}^{N} \frac{C_i}{W_{\mathrm{avg}_i}}$$

with:

- Ci = number of citations to publication i;
- N = total number of publications in series that is analysed;
- Wavgi = World average number of citations for publication i (determined by research field for the journal in which publication i is included and the publication year of publication i).

In this bibliometric analysis the measure for the relative impact is given as a decimal number that shows the relation of the measure to the world average (which is set to the value of 1). For example, a Relative Impact of 1.2 for a particular series of publications from a certain research group means that the research group's publications are cited 20% above the world average of all publications with the same time elapsed since publication and produced in the same research field. Alternatively, in case of Relative Impact of 0.9 the research group's publications are cited 10% below the world average.

Based upon the value of RI, research groups can be divided into groups with low, average and high impact (Van Raan, 2004). The Centre for Science and Technology Studies at Leiden uses the criteria presented in Table 2.1 for the classification of the relative impact at the level of universities and institutes.

Table 2.1 Classification based on relative impact at the level of universities, institutes or graduate schools.

relative impact	classification
RI ≤ 0.5	far below world average impact
0.5 < RI ≤ 0.8	below world average impact
0.8 < RI ≤ 1.2	world average impact
1.2 < RI ≤ 1.5	high average impact
RI > 1.5	very high average impact

At the lower aggregation level, e.g. for chair groups or business units, for which the volume of peer reviewed publications is in the order of 10 - 50 publications per year different criteria are used for the classes for RI, as presented in Table 2.2 (Van Raan, 2004).

Table 2.2 Classification based on relative impact at the level of chair groups or business units.

relative impact	classification
RI ≤ 0.8	below world average impact
0.8 < RI ≤ 1.2	world average impact
1.2 < RI ≤ 2.0	above world average impact
2.0 < RI ≤ 3.0	very good average impact
RI > 3.0	excellent average impact

2.5 Top 10% most cited publications

The top 10% most cited publications is the absolute number of publications with the same or more citations as the percentile thresholds of the top 10%. The top ten percent threshold is dependent upon age and research field (and document type). In addition to the absolute number of highly cited publications, it is more meaningful to look at the number of highly cited publications as a percentage of total publications produced. The percentage of highly cited publications is a good indicator to distinguish excellent research groups from the best research groups (Tijssen et al., 2002; Bornmann & Marx, 2013). Besides the top 10% most cited publications, also the top 1% most cited publications (T1), the top percentile, is given in the results.

2.6 Journal quartiles

When journals are ranked in the Journal Citations Report on their impact factor within their domain, journals can be clustered in quartiles. The 12,000 journals in the Journal Citation Report are classified in 250 different domains. Q1 being the top 25% journals in their domain and so on. The journal quartile score normally has a large effect on the impact of the articles. We have therefore analyzed the impact of

the articles according to their quartiles as well. The total of publications divided over the quartiles can deviate from the total amount of publications used in the impact analysis because some journals don't have an impact factor yet, but are already included in WoS, thus they are not present in the quartile distributions. Determination of the quartile of a publication is based on the JCR in the year of publication.

2.7 Use of colors green and yellow in the tables

- In the tables colors green shading is used to indicate good performance or highest numbers. Yellow is used for lowest number of publications or in other columns weak performance.
- In case of number of publications the green shaded cells are discussed. The other numbers are in most cases too small to draw any general conclusions.
- In case of the relative impact (RI), green shaded cells mean a relative impact of two or higher (very good average impact); yellow shaded cells indicate a relative impact of 0.8 or lower (below world average impact) (Van Raan, 2004).
- In case of the top percent most cited publications: green shaded cells indicate twenty five percent or more for the top ten percent or five percent or more for the top one percent.

2.8 Bibliometric indicators and terminology used

In the next chapters we will present tables with bibliometric indicators per relevant analyzed units. In these tables we use the following parameters:

N:	the number of peer reviewed publications retrieved from the Science Citation Index (SCI) the Social Science Citation Index (SSCI) and the Arts & Humanities Index (AHCI);
C:	total number of citations for these publications;
Wavg:	the world average amount of citations for these articles with the same time elapsed since publication and the same research field;
CPP:	average number of citations per publication;
RI:	relative impact (see paragraph 2.4);
T10perc:	percentage of publications from this group in the world's top 10% most cited publications of the same age and from the same research area (absolute number between brackets);

T10:	absolute number of publications from this group in the world's top 10% most cited publications with the same time elapsed since publication and from the same research area;
T1perc:	percentage of publications from this group in the world's top 1% most cited publications with the same time elapsed since publication and from the same research area (absolute number between brackets);
T1:	absolute number of publications from this group in the world's top 1% most cited publications with the same time elapsed since publication and from the same research area;
NC:	absolute number of not cited publications
NCperc:	percentage of non-cited publications.

Throughout this report the term articles, publications and papers were used. With all three terms we refer to articles or reviews published in peer-reviewed scientific journals.

When we refer to Web of Science (WoS) in the discussion of the results in chapter 3 and 4, we mean the Web of Science Core Collection that covers the Science Citation Index (SCI) the Social Science Citation Index (SSCI) and the Arts & Humanities Index (AHCI).

3 Bibliometric analysis results per division / cluster

3.1 Van der Waals-Zeeman Institute (WZI, UvA)

Table 3.1.1. Bibliometric indicators for WZI over the period 2007-2016.

year	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
2007	49	1663	868	34	1,93	11	22%	3	6%	2	4%
2008	39	1545	700	40	2,23	12	31%	2	5%	3	8%
2009	38	2330	613	61	3,81	15	39%	1	3%	1	3%
2010	45	1486	661	33	2,23	14	31%	1	2%	3	7%
2011	29	642	377	22	1,68	7	24%	0	0%	2	7%
2012	30	758	340	25	2,25	8	27%	3	10%	0	0%
2013	38	716	333	19	2,16	12	32%	1	3%	0	0%
2014	33	713	211	22	3,20	10	30%	2	6%	0	0%
2015	49	375	181	8	2,11	11	22%	1	2%	2	4%
2016	78	303	78	4	4,08	25	32%	6	8%	23	29%

The number of publications fluctuates between 29 in 2011 and 78 in 2016. The highest number of non-cited publications is in the most recent year analyzed, simply because not enough time has passed to receive citations. In all the years the relative impact is above world average; most years have a very good average impact and 2009, 2014 and 2016 can be considered as years of excellent average impact. The number of publications within the ten percent highest cited publications is very well above what can be expected with most years performing two and half times or more above world average. The percentage of publications belonging to the top one percent group in terms of citations received fluctuates.

Table 3.1.2. Bibliometric indicators for WZI per research field for the period 2007-2016.

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
PHYSICS	338	9230	3568	27	2,81	104	31%	16	5%	23	7%
MATERIALS SCIENCE	43	845	486	20	2,21	7	16%	2	5%	7	16%
CHEMISTRY	32	334	218	10	1,84	9	28%	0	0%	5	16%
ENGINEERING	11	108	72	10	4,23	4	36%	2	18%	0	0%
GEOSCIENCES	2	2	10	1	0,11	0	0%	0	0%	1	50%
AGRICULTURAL SCIENCES	1	4	6	4	0,64	0	0%	0	0%	0	0%
CLINICAL MEDICINE	1	8	3	8	2,45	1	100%	0	0%	0	0%

As expected, Physics is by far the largest research field for WZI with 338 publications for the 2007-2016 publication period. This subject category has a very good average impact. WZI performs excellent in the top 10 percent and also in the top one percent most cited publications. Most of the other subject categories perform excellent in all these aspects.

Table 3.1.3. Bibliometric indicators per journal quartile for WZI for the period 2007-2016.

Quartile	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
1	321	9368	3276	29	3,18	113	35%	18	6%	18	6%
2	67	760	655	11	1,21	6	9%	2	3%	14	21%
3	15	44	171	3	0,79	1	7%	0	0%	2	13%
4	5	52	20	10	1,95	3	60%	0	0%	1	20%

The Van der Waals-Zeeman Institute publishes more than three quarters in the first journal quartile (79%) with a very good average impact. One sixth of the publications (16%) is in journals part of the second quartile. The share of publications in the top ten percent publications in the first journal quartile is more than three times (35%) higher than can be expected on world mean average. For the top one percent this is even six times higher. The high portion in the top ten percent most cited publications in the fourth quartile journals is remarkable: even in journals with low impact factors WZI is able to publish articles with a high average impact.

3.2 Institute for Theoretical Physics (ITFA, UvA)

Table 3.2.1. Bibliometric indicators for ITFA over the period 2007-2016.

year	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
2007	50	1637	937	33	1,75	16	32%	0	0%	0	0%
2008	46	1086	831	24	1,31	8	17%	0	0%	2	4%
2009	55	1415	907	26	1,53	15	27%	1	2%	1	2%
2010	60	1311	902	22	1,48	13	22%	0	0%	4	7%
2011	55	1989	754	36	2,64	18	33%	4	7%	0	0%
2012	56	1604	652	29	2,52	20	36%	5	9%	3	5%
2013	65	1736	606	27	2,96	23	35%	3	5%	2	3%
2014	65	1472	475	23	3,24	33	51%	4	6%	3	5%
2015	96	1388	387	14	3,67	43	45%	9	9%	5	5%
2016	113	708	121	6	5,95	62	55%	15	13%	21	19%

The number of publications varies between 46 in 2008 and 113 in 2016. The highest number of non-cited publications is in the most recent year analyzed, simply because not enough time has passed to receive citations. In all years the relative impact is above world average, most years have even a very good average impact and 2014-2016 can be considered as years of excellent average impact. There is a steady increase in relative impact over the last 7 years. The number of publications within the ten percent highest cited publications is very well above what can be expected with most years performing two and half times or more above world average. The percentage of publications belonging to the top one percent group in terms of citations received fluctuates but is five times the world average or higher since 2011.

Table 3.2.2. Bibliometric indicators for ITFA per research field for the period 2007-2016.

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
PHYSICS	542	11888	5314	22	3,18	208	38%	36	7%	29	5%
SPACE SCIENCE	104	2292	1105	22	2,84	39	38%	5	5%	11	11%
ENGINEERING	3	4	31	1	0,14	0	0%	0	0%	0	0%
MATERIALS SCIENCE	3	53	30	18	2,32	2	67%	0	0%	0	0%
SOCIAL SCIENCES	3	3	10	1	0,23	0	0%	0	0%	1	33%
CHEMISTRY	2	36	28	18	1,42	0	0%	0	0%	0	0%
MATHEMATICS	2	23	17	12	1,37	1	50%	0	0%	0	0%
MICROBIOLOGY	1	36	11	36	3,32	1	100%	0	0%	0	0%
NEUROSCIENCE & BEHAVIOR	1	11	29	11	0,38	0	0%	0	0%	0	0%

Almost all publications are covered by two subject categories: Physics and Space Science (including cosmology) with 542 and 104 publications for the 2007-2016 publication period. The relative impact of Space Science is very good; that of Physics even excellent. ITFA also performs excellent in both the top 10 and the top 1 percent most cited publications.

Table 3.2.3. Bibliometric indicators per journal quartile for ITFA for the period 2007-2016

Quartile	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
1	444	9532	4015	21	3,41	180	41%	33	7%	29	7%
2	59	770	570	13	2,12	17	29%	0	0%	4	7%
3	24	317	229	13	2,42	3	13%	2	8%	4	17%
4	5	6	72	1	0,08	0	0%	0	0%	1	20%

The Institute for Theoretical Physics publishes more than three quarters in the first journal quartile (83%) with excellent average impact. The high relative impact of the publications in the second and third quartile journals is remarkable: even in journals with low impact factors this department is able to publish articles with a very good average impact. The share of publications in the top ten percent publications in the first journal quartile is more than four times (41%) higher than can be expected on world mean average; for the top one percent this is even seven times higher.

3.3 Institute for High Energy Physics (IHEF, UvA) and Astro-Particle Physics (APP, VU)

Table 3.3.1. Bibliometric indicators for IHEF & APP over the period 2007-2016.

year	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
2007	122	3560	2189	29	1,64	27	22%	3	2%	2	2%
2008	158	6006	2817	38	2,11	45	28%	4	3%	5	3%
2009	128	4430	2142	35	2,07	33	26%	5	4%	1	1%
2010	130	6231	2056	48	3,15	45	35%	6	5%	4	3%
2011	186	5670	2501	30	2,33	64	34%	10	5%	5	3%
2012	278	13523	3234	49	4,32	118	42%	17	6%	9	3%
2013	245	7701	2242	31	3,57	100	41%	23	9%	5	2%
2014	203	4098	1361	20	3,09	89	44%	15	7%	7	3%
2015	253	3898	948	15	4,21	111	44%	27	11%	6	2%
2016	310	4146	310	13	13,49	167	54%	54	17%	61	20%

The number of publications varies between 122 in 2007 and 310 in 2016. There is a steady increase in number of publications. The highest number of non-cited publications is in the most recent year analyzed, simply because not enough time has passed to receive citations. In all years the relative impact is above world average, most years have even a very good average impact and 2013-2016 can be considered as years of excellent average impact. There is a steady increase in relative impact over the last 7 years. The number of publications within the ten percent highest cited publications is three to five times higher than can be expected compared to the world average. Every year several publications belong to the top one percent group in terms of citations received. The percentage of publications belonging to the top one percent group in terms of citations received increases over time up to seventeen times the world average in 2016.

Table 3.3.2. Bibliometric indicators for IHEF & APP per research field for the period 2007-2016.

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
PHYSICS	1789	53789	17020	30	5,00	732	41%	149	8%	80	4%
SPACE SCIENCE	160	4028	2228	25	3,14	52	33%	12	8%	8	5%
CHEMISTRY	46	1237	437	27	2,24	9	20%	3	7%	12	26%
GEOSCIENCES	4	82	31	21	1,38	1	25%	0	0%	2	50%
MATERIALS SCIENCE	4	4	4	1	0,93	0	0%	0	0%	2	50%
CLINICAL MEDICINE	2	8	2	4	4,94	2	100%	0	0%	0	0%
ENGINEERING	2	8	10	4	1,99	1	50%	0	0%	0	0%

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
COMPUTER SCIENCE	1	12	11	12	1,04	0	0%	0	0%	0	0%
MICROBIOLOGY	1	15	4	15	3,90	1	100%	0	0%	0	0%
MOLECULAR BIO. & GENETICS	1	7	6	7	1,25	0	0%	0	0%	0	0%
MULTIDISCIPLINARY	1	45	15	45	3,06	1	100%	0	0%	0	0%
NEUROSCIENCE & BEHAVIOR	1	28	32	28	0,88	0	0%	0	0%	0	0%
PSYCHIATRY/PSYCHOLOGY	1	0	1	0	0,00	0	0%	0	0%	1	100%

Almost all publications are covered by two subject categories: Physics and Space Science with 1789 and 160 publications for the 2007-2016 publication period. The relative impact of Physics and Space Science is excellent. They also perform two and half times or more above world average in the top 10 and five times or higher the world average for the top one percent.

Table 3.3.3. Bibliometric indicators per journal quartile for IHEF & APP for the period 2007-2016

Quartile	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
1	1530	47220	14394	31	5,46	662	43%	140	9%	71	5%
2	160	4012	1652	25	3,23	41	26%	11	7%	17	11%
3	24	208	139	9	2,59	5	21%	1	4%	7	29%
4	13	655	102	50	2,41	1	8%	1	8%	6	46%

The Institute for High Energy Physics and the Department of Astro-Particle Physics jointly publish almost ninety percent (89%) in the first journal quartile with high average relative impact. The relative impact of the publications in all other quartile journals is remarkable: even in journals with lower impact factors this department is able to publish articles with an very good or excellent average impact. The share of publications in the top ten percent publications in the first journal quartile is more than four times (43%) higher than can be expected on world mean average; for the top one percent this is even nine times higher.

3.4 LaserLaB (LLB, VU)

Table 3.4.1. Bibliometric indicators for LLB over the period 2007-2016.

year	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
2007	232	8556	4866	37	1,85	59	25%	9	4%	22	9%
2008	222	7574	4441	34	1,72	61	27%	2	1%	9	4%
2009	197	6161	3707	31	1,72	47	24%	3	2%	7	4%
2010	128	4959	2342	39	2,22	39	30%	5	4%	2	2%
2011	152	4077	2365	27	1,80	35	23%	2	1%	6	4%
2012	182	4583	2274	25	2,19	59	32%	6	3%	9	5%
2013	150	3099	1521	21	1,97	34	23%	4	3%	11	7%
2014	179	2654	1272	15	2,13	51	28%	7	4%	17	9%
2015	161	958	652	6	1,59	31	19%	2	1%	28	17%
2016	141	372	143	3	2,65	49	35%	5	4%	45	32%

The number of publications varies between 129 in 2010 and 232 in 2007. The highest number of non-cited publications is in the most recent years analyzed (2015-2016), simply because not enough time has passed to receive citations. In all years the relative impact is above world average, with four years having a very good average impact. The number of publications within the ten percent highest cited publications is well above what can be expected, with fluctuations over time. Every year several publications belong to the top one percent group in terms of citations received also with fluctuation over time.

Table 3.4.2. Bibliometric indicators for LLB per research field for the period 2007-2016.

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
PHYSICS	807	21155	10126	26	2,17	244	30%	23	3%	36	4%
BIOLOGY & BIOCHEMISTRY	331	8303	5508	25	1,54	77	23%	6	2%	72	22%
CHEMISTRY	291	5752	3894	20	1,49	55	19%	3	1%	18	6%
CLINICAL MEDICINE	69	1287	726	19	1,87	24	35%	0	0%	8	12%
MATERIALS SCIENCE	56	1607	652	29	2,64	18	32%	2	4%	4	7%
MOLECULAR BIO. & GENETICS	34	1571	859	46	2,28	6	18%	2	6%	1	3%
ENGINEERING	32	677	333	21	2,02	10	31%	1	3%	0	0%
PLANT & ANIMAL SCIENCE	30	481	254	16	3,54	9	30%	4	13%	7	23%
GEOSCIENCES	23	519	352	23	1,77	4	17%	1	4%	1	4%
SPACE SCIENCE	19	443	279	23	1,69	6	32%	0	0%	0	0%
MATHEMATICS	16	209	122	13	1,83	5	31%	0	0%	1	6%
NEUROSCIENCE & BEHAVIOR	12	291	218	24	1,17	1	8%	1	8%	2	17%

Category	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
COMPUTER SCIENCE	11	270	107	25	3,74	1	9%	1	9%	2	18%
PSYCHIATRY/PSYCHOLOGY	5	99	45	20	1,49	2	40%	0	0%	1	20%
MICROBIOLOGY	5	272	49	54	4,81	3	60%	1	20%	2	40%
IMMUNOLOGY	2	57	62	29	0,92	0	0%	0	0%	0	0%
PHARMACOLOGY & TOXICOLOGY	1	0	1	0	0,00	0	0%	0	0%	1	100%

Physics is the largest research field for LLB with 807 publications. Together with Biology & Biochemistry and Chemistry more than 80% of the publications are covered. The relative impact of Physics is very good. Biology & Biochemistry and Chemistry have relative impacts above world average. Physics also performs three times the world average in the top 10 percent most cited publications. The other two categories are well above world average.

Table 3.4.3. Bibliometric indicators per journal quartile for LLB for the period 2007-2016.

Quartile	N	C	Wavg	CPP	RI	T10	T10perc	T1	T1perc	NC	NCperc
1	1248	34719	16541	28	2,25	396	32%	40	3%	109	9%
2	252	3364	3684	13	1,00	24	10%	1	0%	27	11%
3	82	684	1085	8	0,86	6	7%	1	1%	13	16%
4	23	656	239	29	1,67	2	9%	1	4%	5	22%

The LaserLaB publishes more than three-quarters in the first journal quartile (78%) with a very good average impact. One six of the publications (16%) is in journals part of the second quartile. The share of publications in the top ten percent publications in the first journal quartile is more than three times (32%) higher than can be expected on world mean average. For the top one percent this is three times higher.

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