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От Сильченко О.К.

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The XXL Survey
XLV. Linking the ages of optically selected groups to their X-ray emission

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Обзоры неба GAMA+XMM-Newton

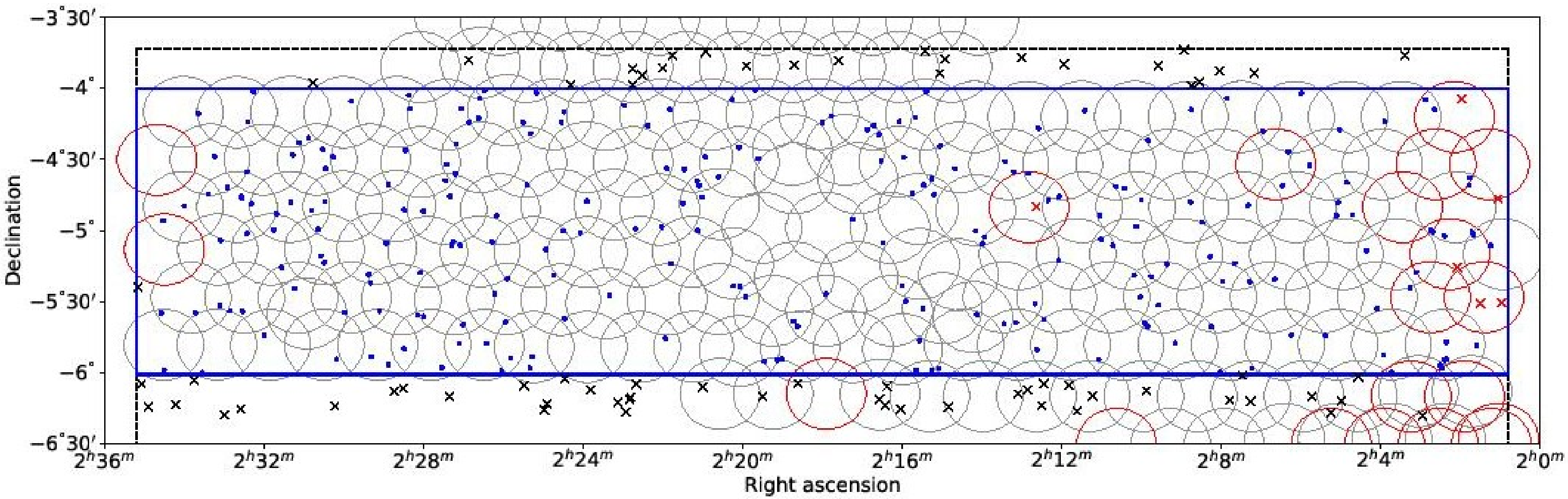


Fig. 1. Locations of the FoF group centres (blue points) with respect to the XXL fields (grey and red circles). The GAMA field used in this study is shown with a blue box, taken as a subset from the G02 field (dashed black lines). We remove six optical groups (red crosses) that lie in fields with high sky backgrounds (red circles), in addition to groups outside our matching area (black crosses). The remaining 232 groups (blue points) are taken for this analysis (see Table 1 for details).

Рентген в группах галактик

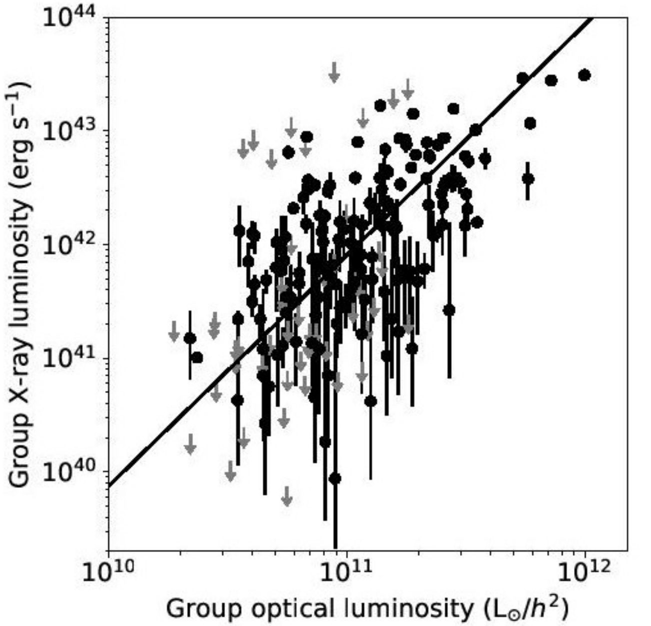
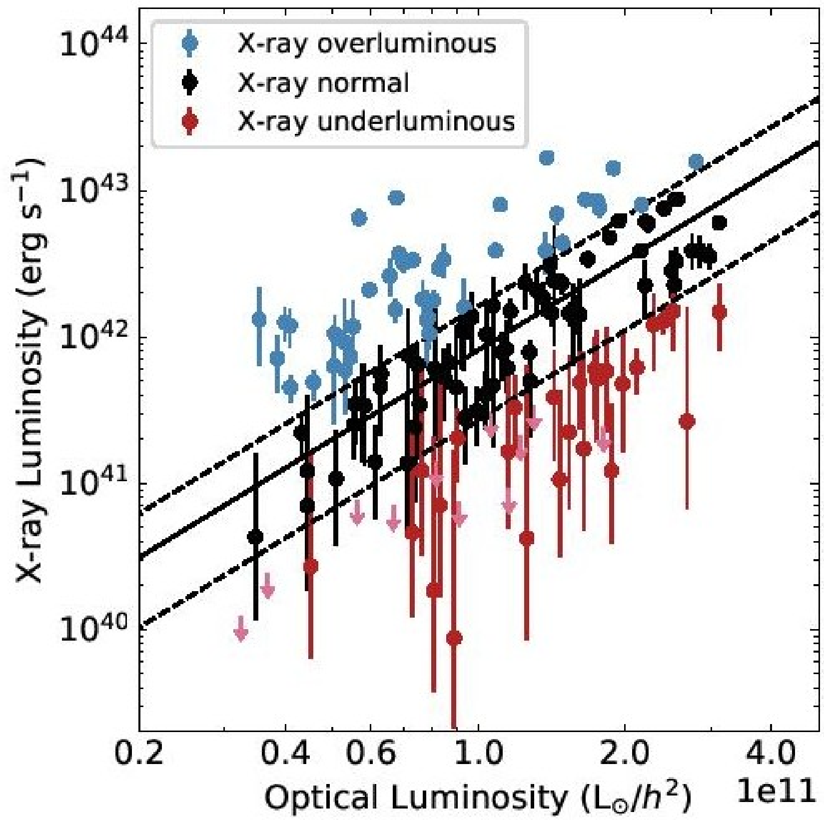


Fig. 4. L^{XXL}_{300kpc} versus L_{opt} for all GAMA groups, with 1σ uncertainties shown. The 90% confidence upper limits on the X-ray luminosity are denoted with grey arrows. Five groups in which the GAMA centre is substantially offset from the X-ray position have been readjusted to reflect the aperture luminosity centred on the X-ray source position. The best fit line, using a bisection of linear fits, is shown as a black line.



Выборка

two properties, we truncate our sample by excluding groups outside the redshift range $0.05 < z < 0.35$ and the optical luminosity range $10.5 < \log(L_{opt}/L_{\odot}/h^2) < 11.5$. As an indication of the expected total mass of these groups, we can use the scaling relation between total Sloan Digital Sky Survey (SDSS) r-band luminosity and virial mass found by weak lensing mass from the work of Mulroy et al. (2017). For our optical luminosity range, this scaling relation finds that the virial mass range is: $13.4 < \log(M_{group}/M_{\odot}) < 14.2$. The resultant sample of groups, split into respective X-ray overluminous, normal, and underluminous sub-samples is shown in Fig. 5.

After imposing group luminosity limits and redshift limits and removing upper limit points in the X-ray overluminous and X-ray normal samples, we are left with a final group sample of 142 groups, with 40, 65, and 37 X-ray overluminous, normal, and underluminous groups, respectively. These groups contain a total of 1163 galaxies, with 295, 538, and 330 galaxies in each of the respective sub-samples.

Сравнение трех подгрупп

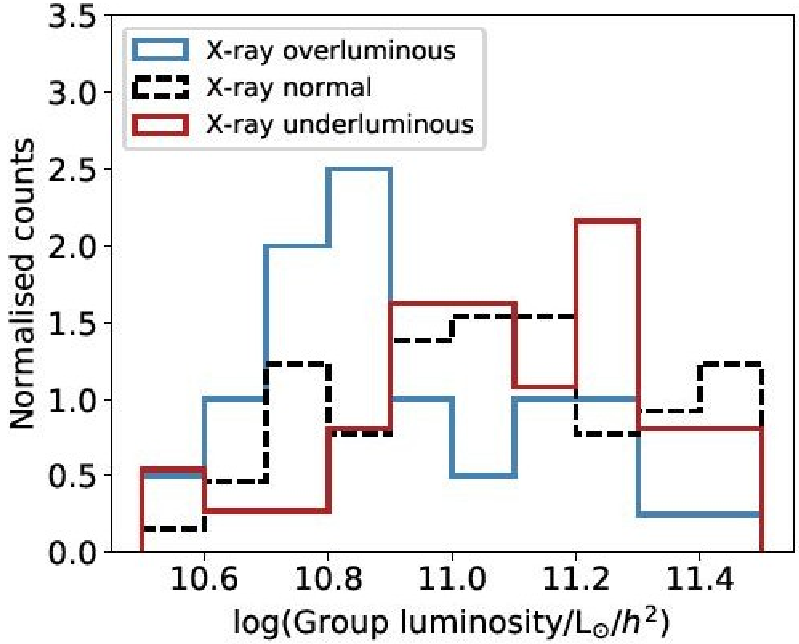


Fig. 7. Histogram showing the distribution of group log(L_{opt}) for X-ray overluminous (blue), X-ray normal (dashed black), and X-ray underluminous (red) sub-samples. We find the average group L_{opt} increases from X-ray overluminous to X-ray underluminous samples.

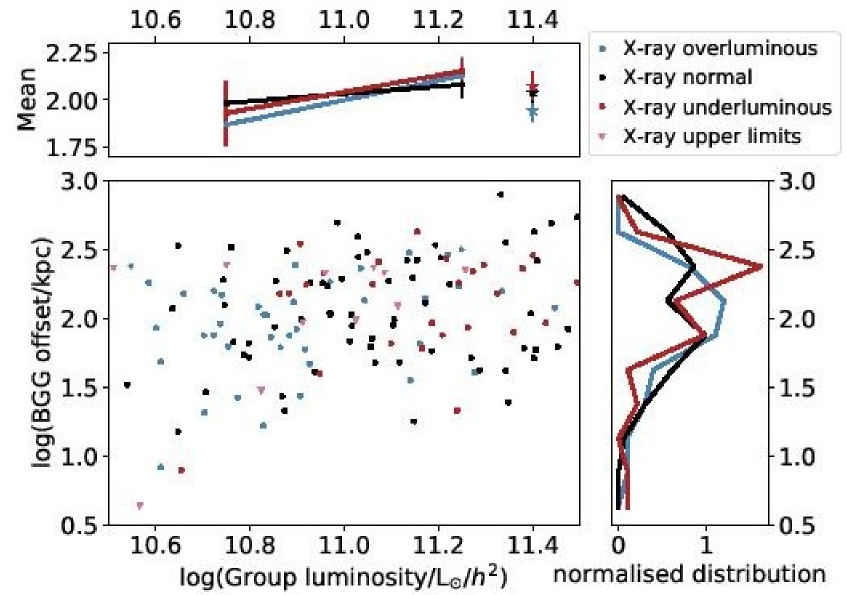


Fig. 8. Values of the offset of the central galaxy from the optical luminosity weighted centre for each member of the X-ray overluminous (blue), X-ray normal (black), and X-ray underluminous (red) subsamples. Underluminous groups with X-ray upper limits are denoted with a light red triangle. The main panel shows the values for each group, while the right panel shows the distribution of central galaxy offset for each of the sub-samples. The top panel shows the sub-sample means, both across the full range in L_{opt} (stars) and split into two bins in L_{opt} (circles). X-ray underluminous systems have, on average, larger offsets than the X-ray overluminous groups.

Further details of these group parameters and how they have been calculated are presented in Robotham et al. (2011).

Сравнение трех подгрупп

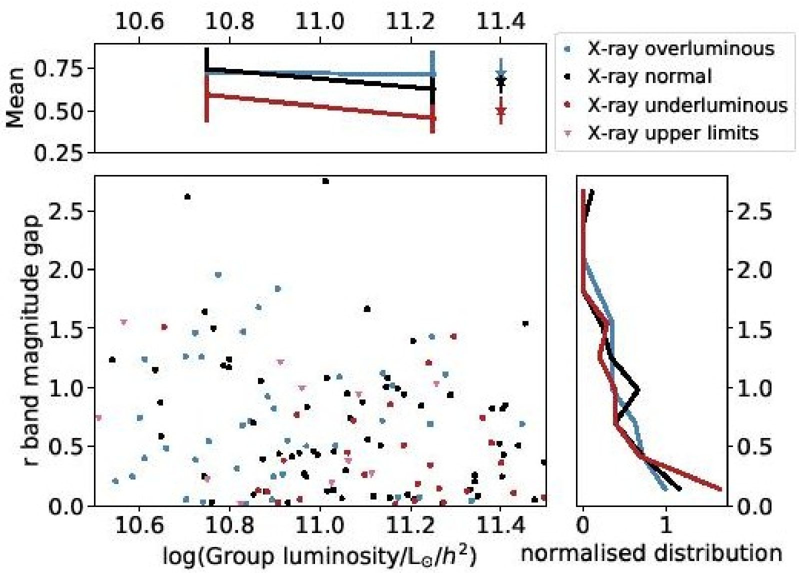
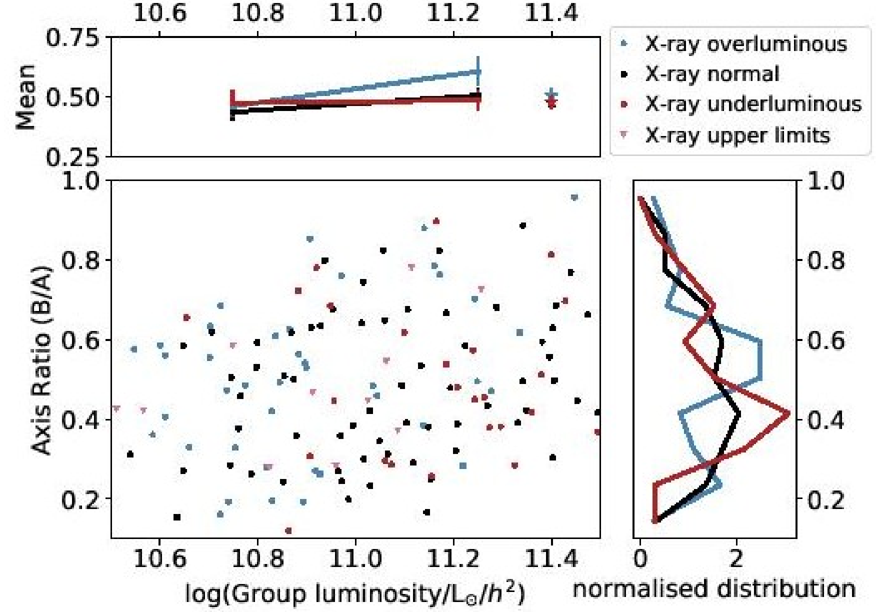


Fig. 9. Similar to Fig. 8, showing the difference in magnitude between the two brightest member galaxies of each group. We see a trend in magnitude gap from the X-ray underluminous groups to the overluminous groups.



Сравнение трех подгрупп

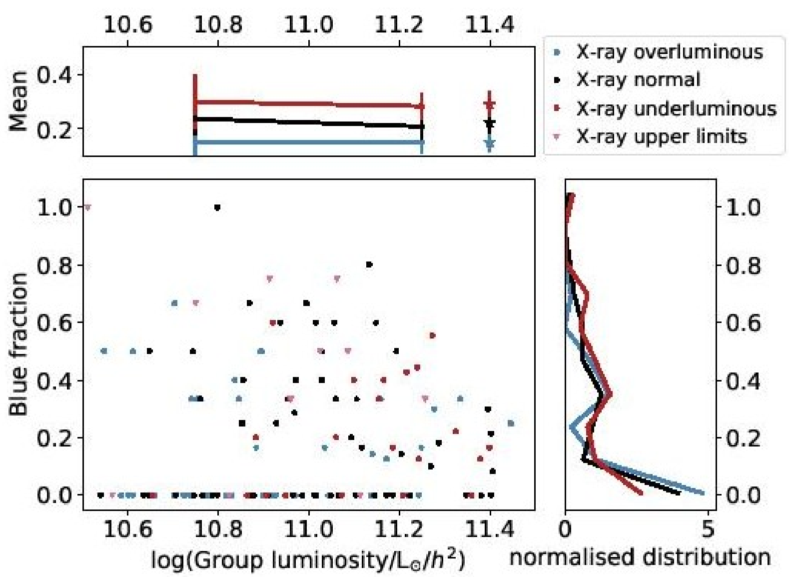


Fig. 12. Similar to Fig. 8, showing the fraction of blue galaxies in each group. The blue fraction is calculated for galaxies brighter than our absolute magnitude limit of $M_r = -21.1$ mag. We find that the X-ray overluminous groups have a lower blue fraction across the entire L_{opt} range compared with the X-ray underluminous groups. Galaxies in X-ray 'normal' groups are intermediate.

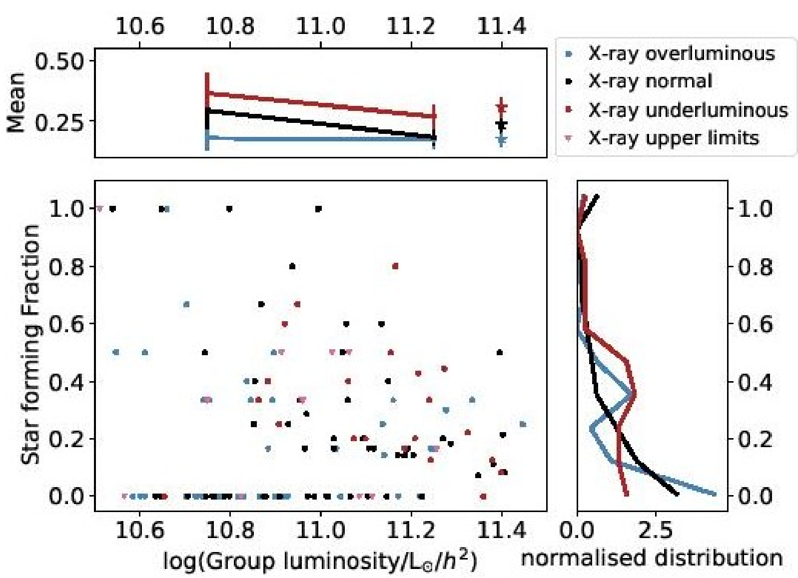


Fig. 14. Same as Fig. 9, showing the fraction of star forming galaxies brighter than $M_r = -21.1$ mag in each group. The X-ray overluminous groups have a low star forming fraction across the entire L_{opt} range, while star formation in the underluminous groups depends more on the L_{opt} value.

Вывод: высокая рентгеновская светимость – у динамически продвинутых групп

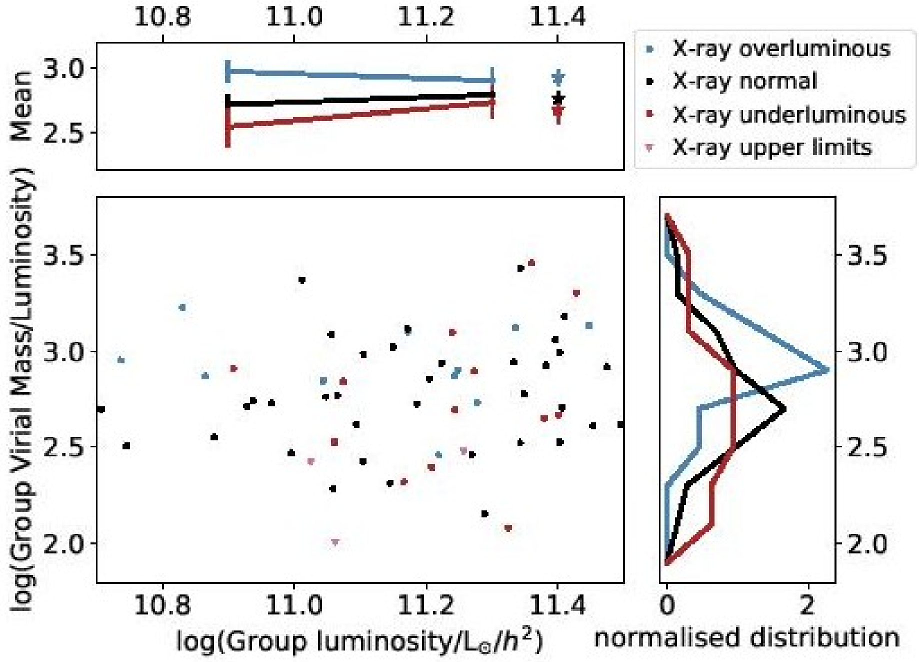


Fig. 15. Distribution in the scaled group virial mass for the three subsamples when only high multiplicity groups (N_{gal}>7) are included. X-ray overluminous groups show a higher scaled mass compared to X-ray underluminous systems.

Но есть группы без рентгена, которые этим не объяснить…

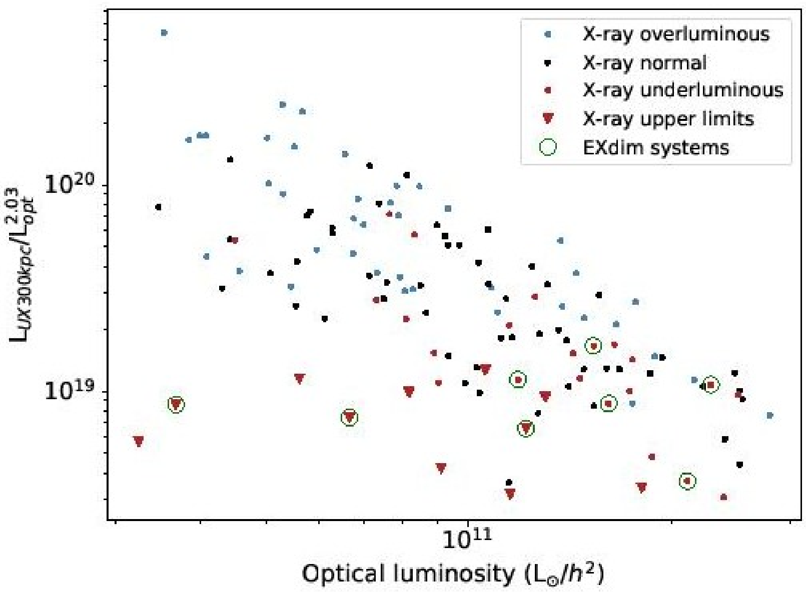


Fig. 16. Ratio of $L_{UX300kpc}/L_{opt}^{2.03}$ (U_{XO}) plotted against L_{opt} for all groups. Blue, black, and red colours denote groups in the X-ray overluminous, normal and underluminous subsamples. Inverted triangles denote X-ray upper limits, where no significant X-ray flux value was detected. We highlight X-ray underluminous systems with properties suggesting an evolved group (called here EXdim groups) with green circles. If these groups are dynamically evolved their low X-ray emission must have some other cause.

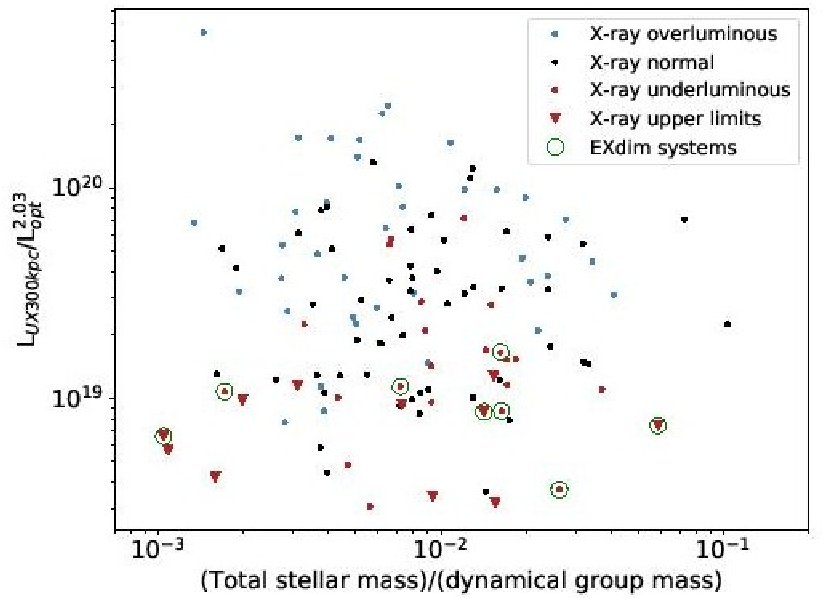


Fig. 17. U_{XO} versus the group total group stellar mass/group dynamical mass. Symbols are as in Fig. 16. The EXdim systems are shown with green circles. These evolved X-ray dim groups clearly do not preferentially fall towards the right of the diagram and hence do not have an unusually large fraction of their baryons locked into stars.

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Impact of COVID-19 on Astronomy: Two Years In

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We study the impact of the COVID-19 pandemic on astronomy using public records of astronomical publications. We show that COVID-19 has had both positive and negative impacts on research in astronomy. We find that the overall output of the field, measured by the yearly paper count, has increased. This is mainly driven by boosted individual productivity seen across most countries, possibly the result of cultural and technological changes in the scientific community during COVID. However, a decreasing number of incoming new researchers is seen in most of the countries we studied, indicating larger barriers for new researchers to enter the field or for junior researchers to complete their first project during COVID. Unfortunately, the overall improvement in productivity seen in the field is not equally shared by female astronomers. By fraction, fewer papers are written by women and fewer women are among incoming new researchers in most countries. Even though female astronomers also became more productive during COVID, the level of improvement is smaller than for men. Pre-COVID, female astronomers in the Netherlands, Australia, Switzerland were equally as or even more productive than their male colleagues. During COVID, no single country's female astronomers were able to be more productive than their male colleagues on average.

Факторы – позитивные и негативные

- Негативные: здоровье (физическое и ментальное), уход за детьми, уход за родителями, закрытие вакансий для молодежи…
- Позитивные: все сидят на месте и работают, не отвлекаясь на поездки

Как результат, число статей растет

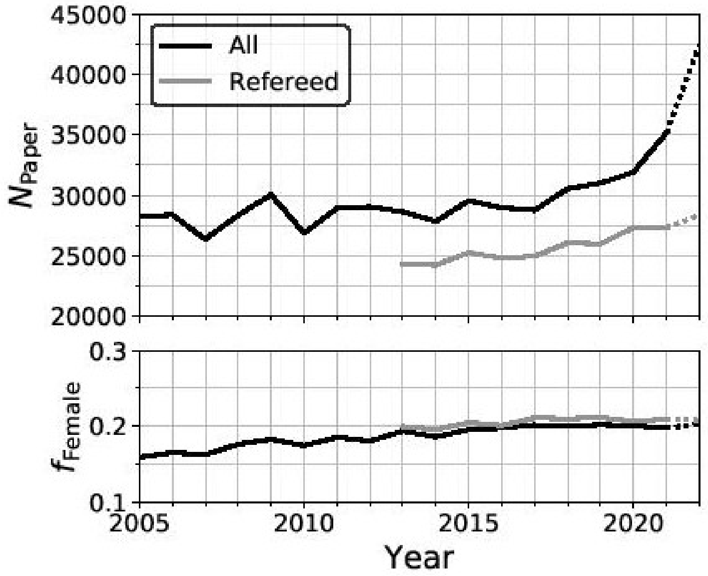

FIG. 1. **Top**: Number of papers in astronomy per year for all papers (black) and refereed papers (grey). **Bottom**: The fraction of papers each year written by female first authors. The dotted lines are projections using partial year data from 2022. The Poisson errors are at the sub-percent level (nearly invisible if shown), and hence the fluctuations seen here are likely due to socioeconomic changes.

… но не у женщин и не у молодежи в западных странах