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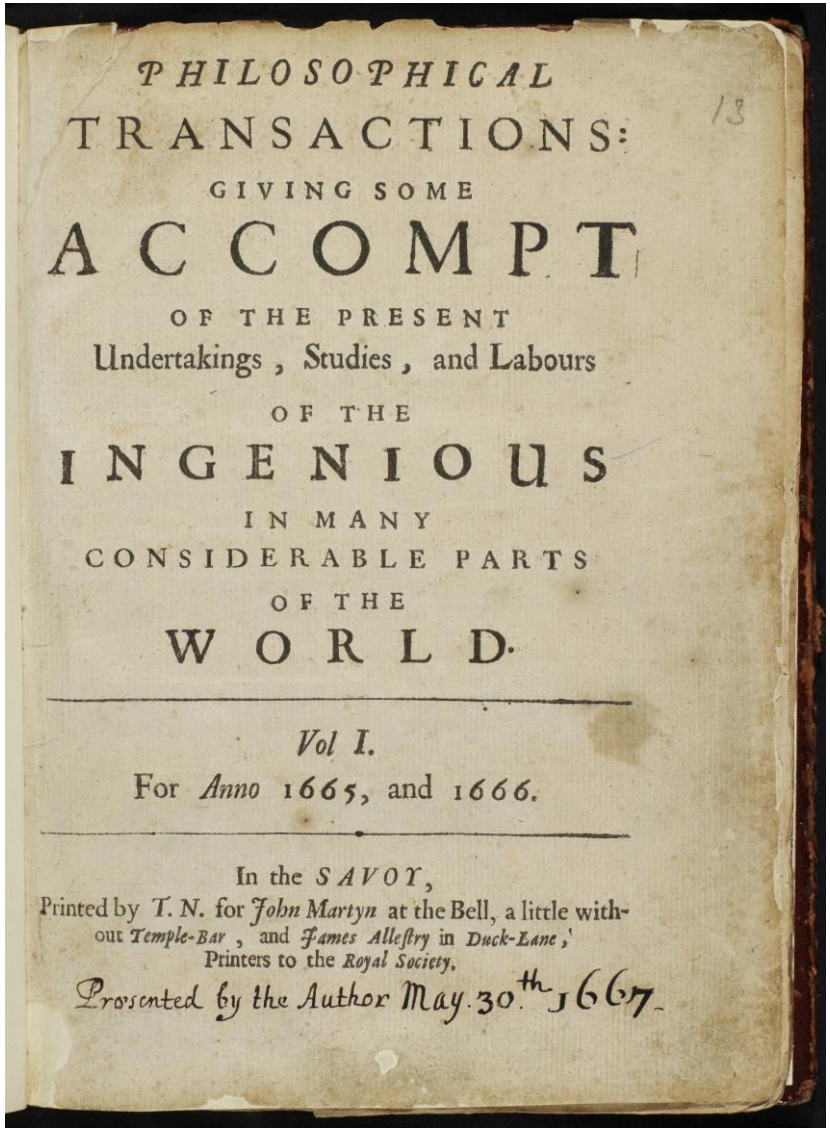

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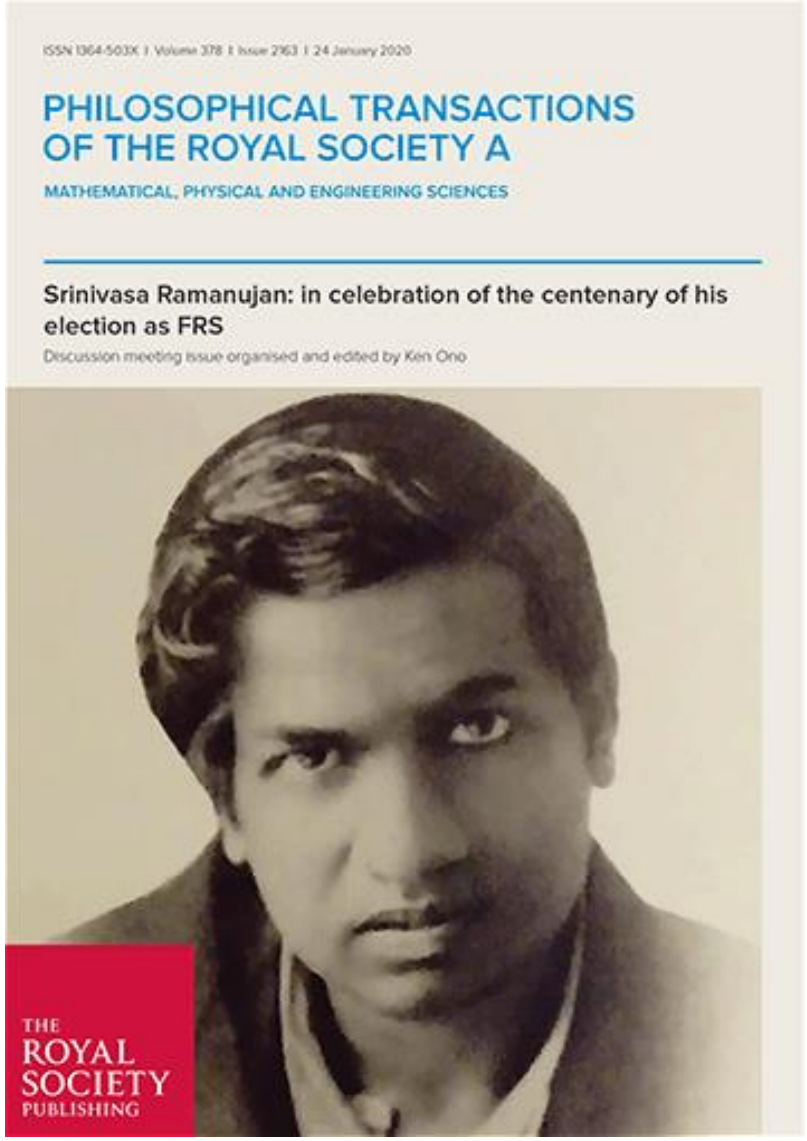

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Uchenna Kesieme,*[ab] Kayvan Pazouki,[b] Alan Murphy[b] and Andreas Chrysanthou[a]

Author affiliations

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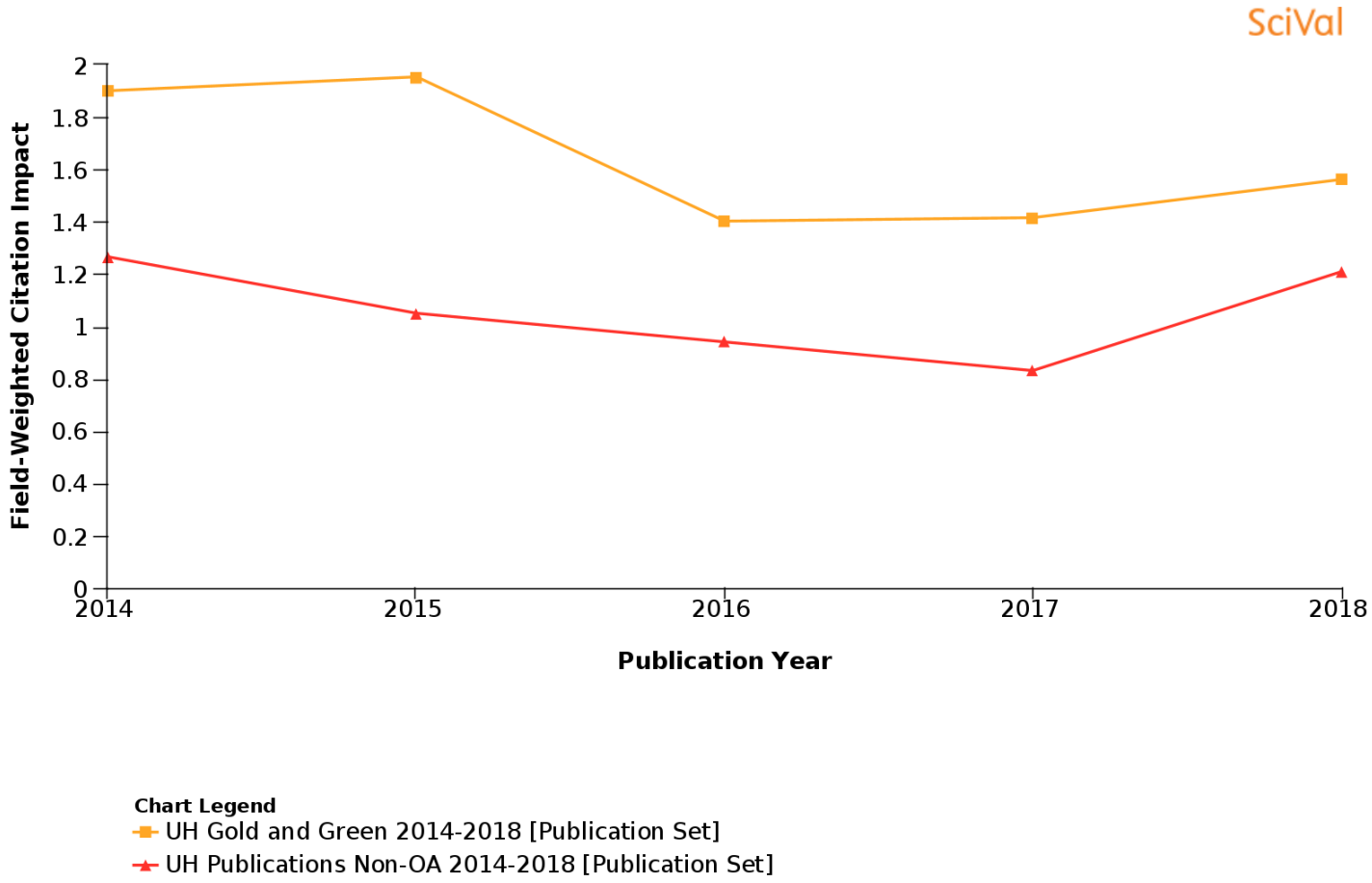

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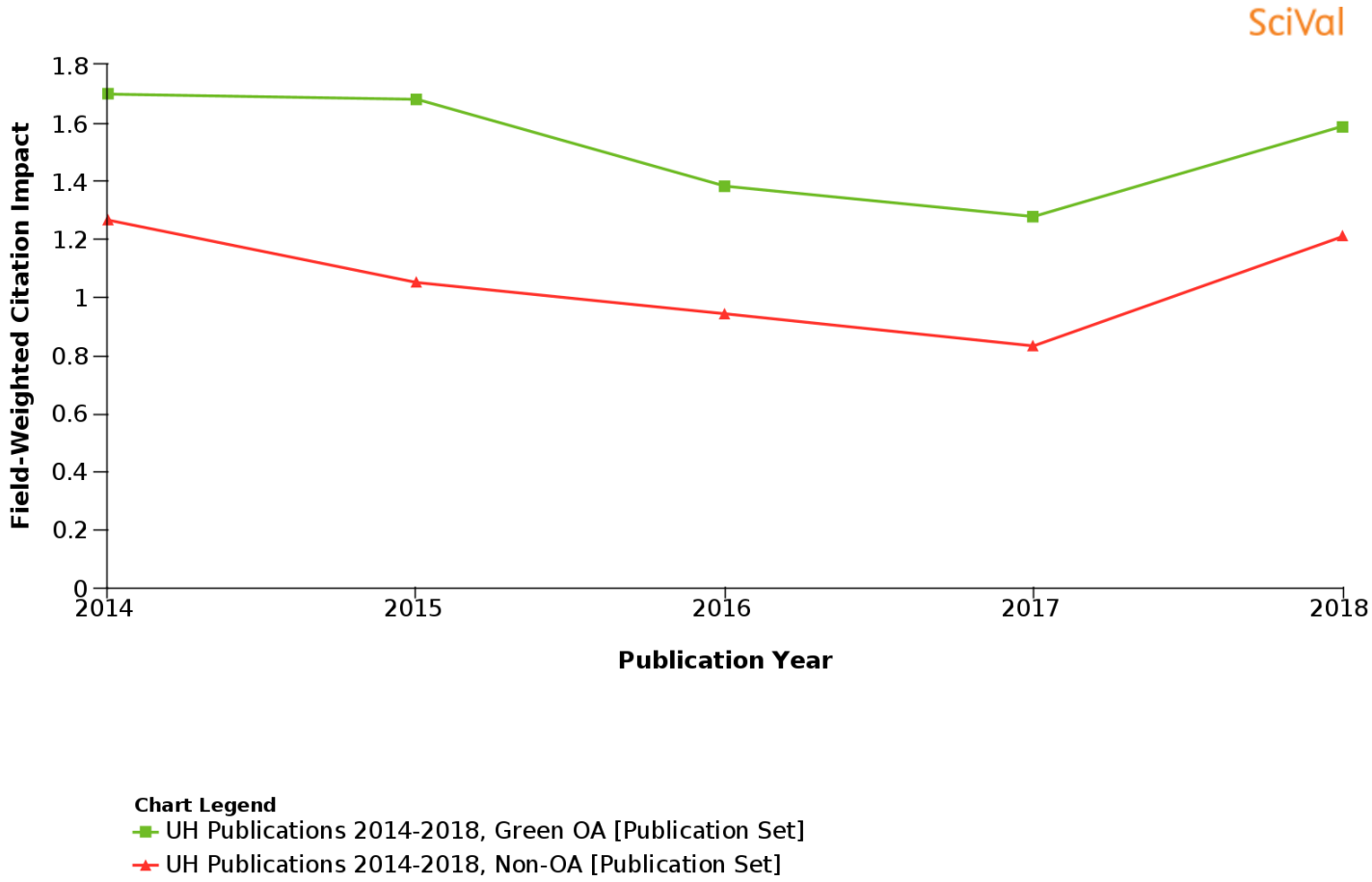

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Springer Nature

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The global analysis showed that:

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- OA articles attracted an average of 2.4 times more Altmetric attention, with 1.9 times more news mentions than non-OA articles.

We sampled

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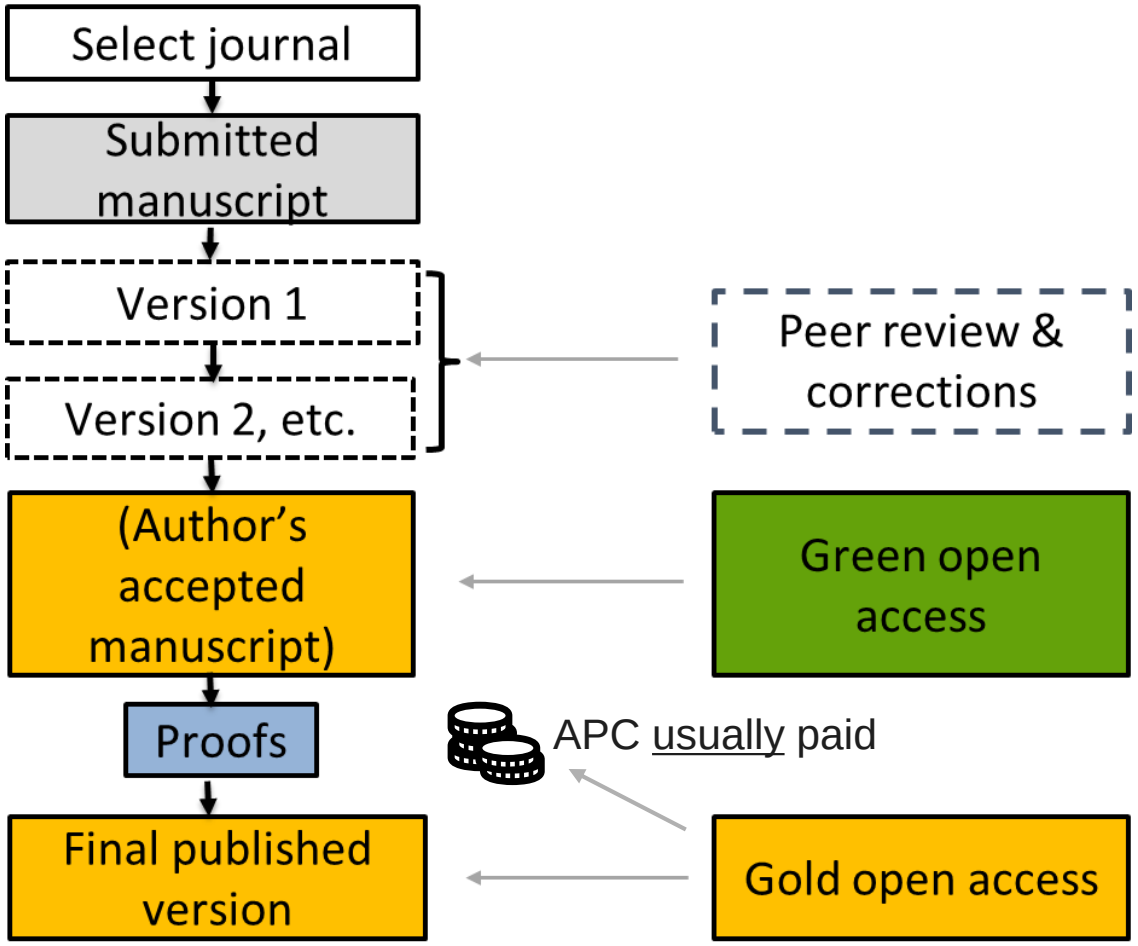

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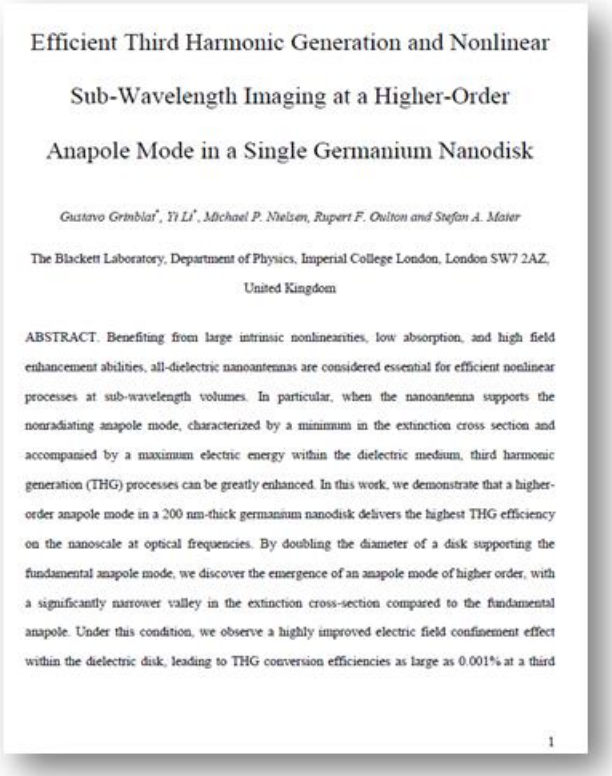

Efficient Third Harmonic Generation and Nonlinear Sub-Wavelength Imaging at a Higher-Order Anapole Mode in a Single Germanium Nanodisk

Gustavo Grinblat, Yi Li*, Michael P. Nielsen, Rupert F. Oulton and Stefan A. Maier*

The Blackett Laboratory, Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom

ABSTRACT. Benefiting from large intrinsic nonlinearities, low absorption, and high field enhancement abilities, all-dielectric nanoantennas are considered essential for efficient nonlinear processes at sub-wavelength volumes. In particular, when the nanoantenna supports the nonradiating anapole mode, characterized by a minimum in the extinction cross section and accompanied by a maximum electric energy within the dielectric medium, third harmonic generation (THG) processes can be greatly enhanced. In this work, we demonstrate that a higher-order anapole mode in a 200 nm-thick germanium nanodisk delivers the highest THG efficiency on the nanoscale at optical frequencies. By doubling the diameter of a disk supporting the fundamental anapole mode, we discover the emergence of an anapole mode of higher order, with a significantly narrower valley in the extinction cross-section compared to the fundamental anapole. Under this condition, we observe a highly improved electric field confinement effect within the dielectric disk, leading to THG conversion efficiencies as large as 0.001% at a third

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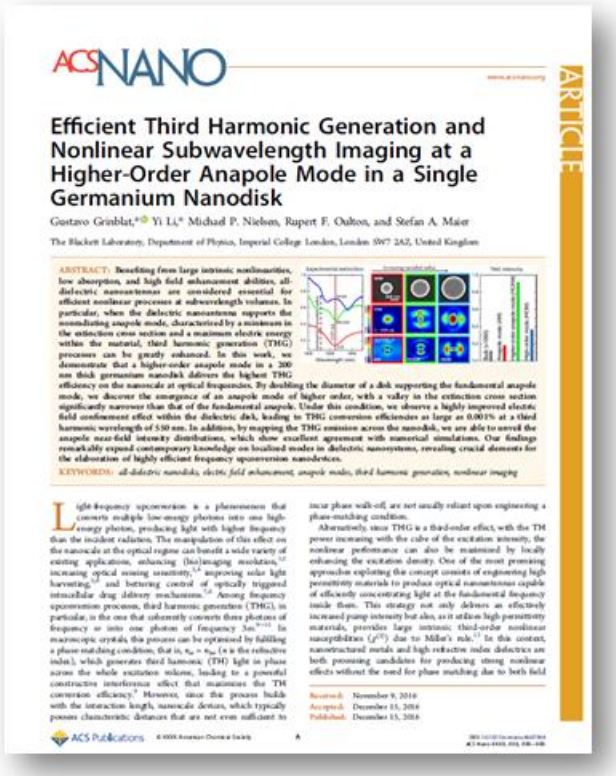

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KEYWORDS: *all-dielectric nanodisks, electric field enhancement, anapole modes, third harmonic generation, nonlinear imaging*

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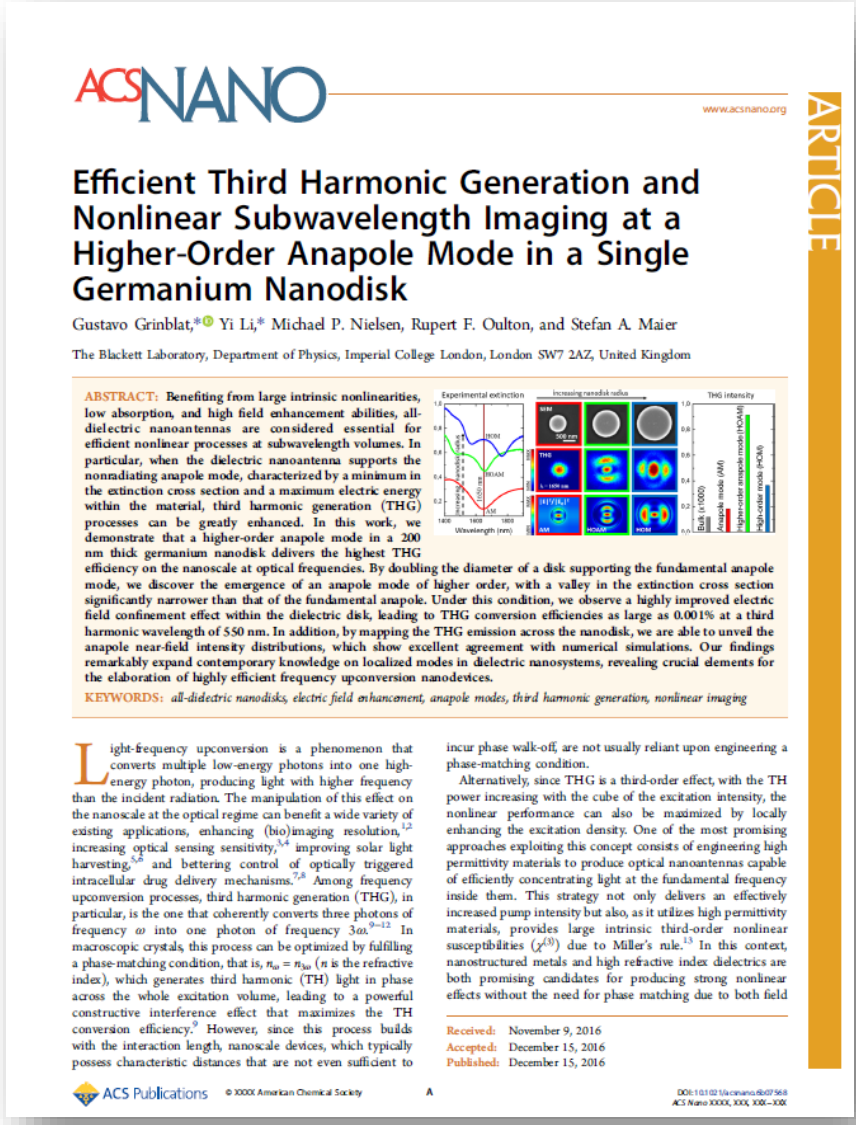

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KEYWORDS: *all-dielectric nanodisks, electric field enhancement, anapole modes, third harmonic generation, nonlinear imaging*

Light-frequency upconversion is a phenomenon that converts multiple low-energy photons into one high-energy photon, producing light with higher frequency than the incident radiation. The manipulation of this effect on the nanoscale at the optical regime can benefit a wide variety of existing applications, enhancing (bio)imaging resolution,[1,2] increasing optical sensing sensitivity,[3,4] improving solar light harvesting,[5,6] and bettering control of optically triggered intracellular drug delivery mechanisms.[7,8] Among frequency upconversion processes, third harmonic generation (THG), in particular, is the one that coherently converts three photons of frequency ω into one photon of frequency 3ω.[9−12] In macroscopic crystals, this process can be optimized by fulfilling a phase-matching condition, that is, $n_\omega = n_{3\omega}$ (n is the refractive index), which generates third harmonic (TH) light in phase across the whole excitation volume, leading to a powerful constructive interference effect that maximizes the TH conversion efficiency.[9] However, since this process builds with the interaction length, nanoscale devices, which typically possess characteristic distances that are not even sufficient to incur phase walk-off, are not usually reliant upon engineering a phase-matching condition.

Alternatively, since THG is a third-order effect, with the TH power increasing with the cube of the excitation intensity, the nonlinear performance can also be maximized by locally enhancing the excitation density. One of the most promising approaches exploiting this concept consists of engineering high permittivity materials to produce optical nanoantennas capable of efficiently concentrating light at the fundamental frequency inside them. This strategy not only delivers an effectively increased pump intensity but also, as it utilizes high permittivity materials, provides large intrinsic third-order nonlinear susceptibilities ($\chi^{(3)}$) due to Miller's rule.[13] In this context, nanostructured metals and high refractive index dielectrics are both promising candidates for producing strong nonlinear effects without the need for phase matching due to both field

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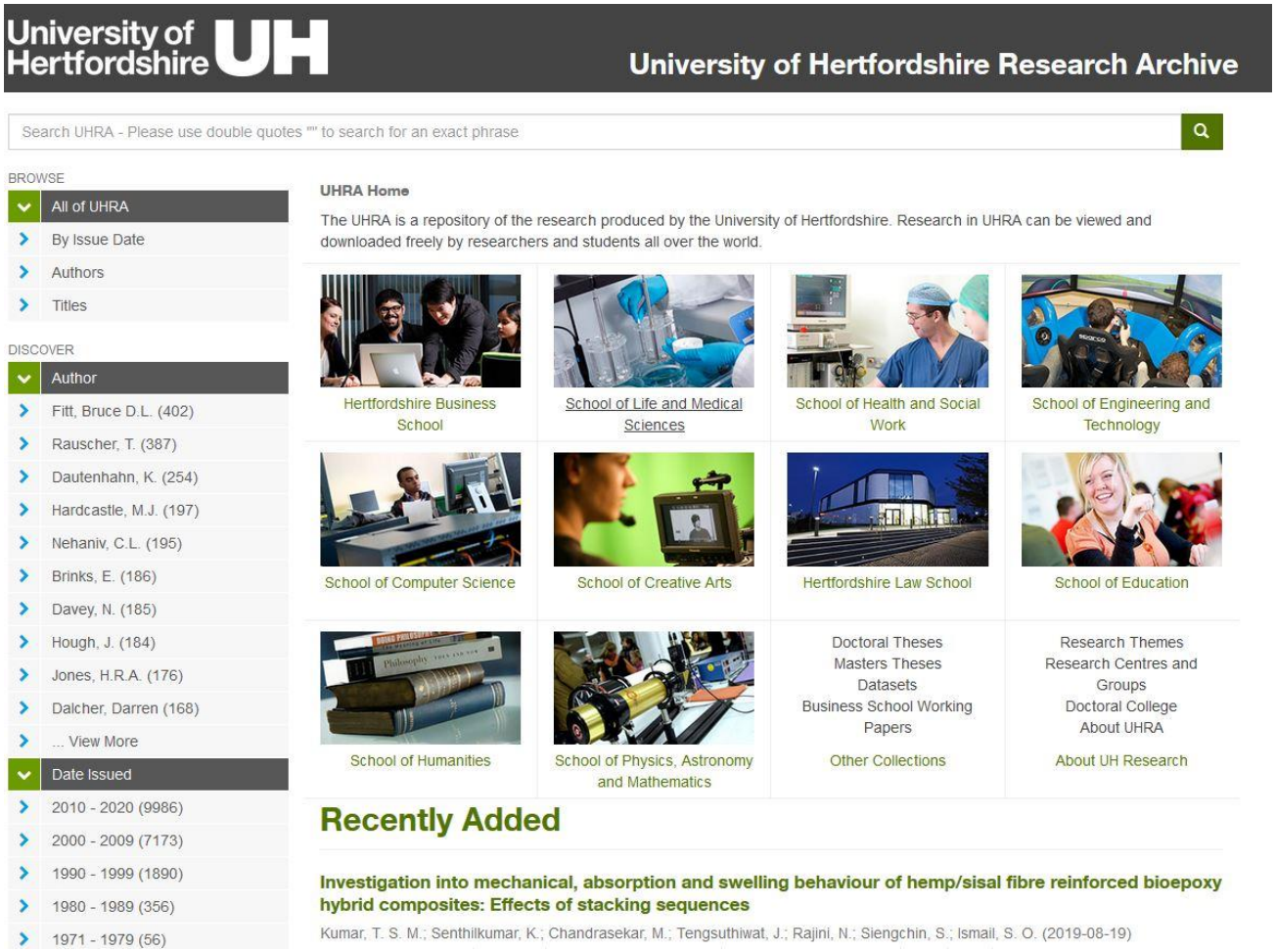

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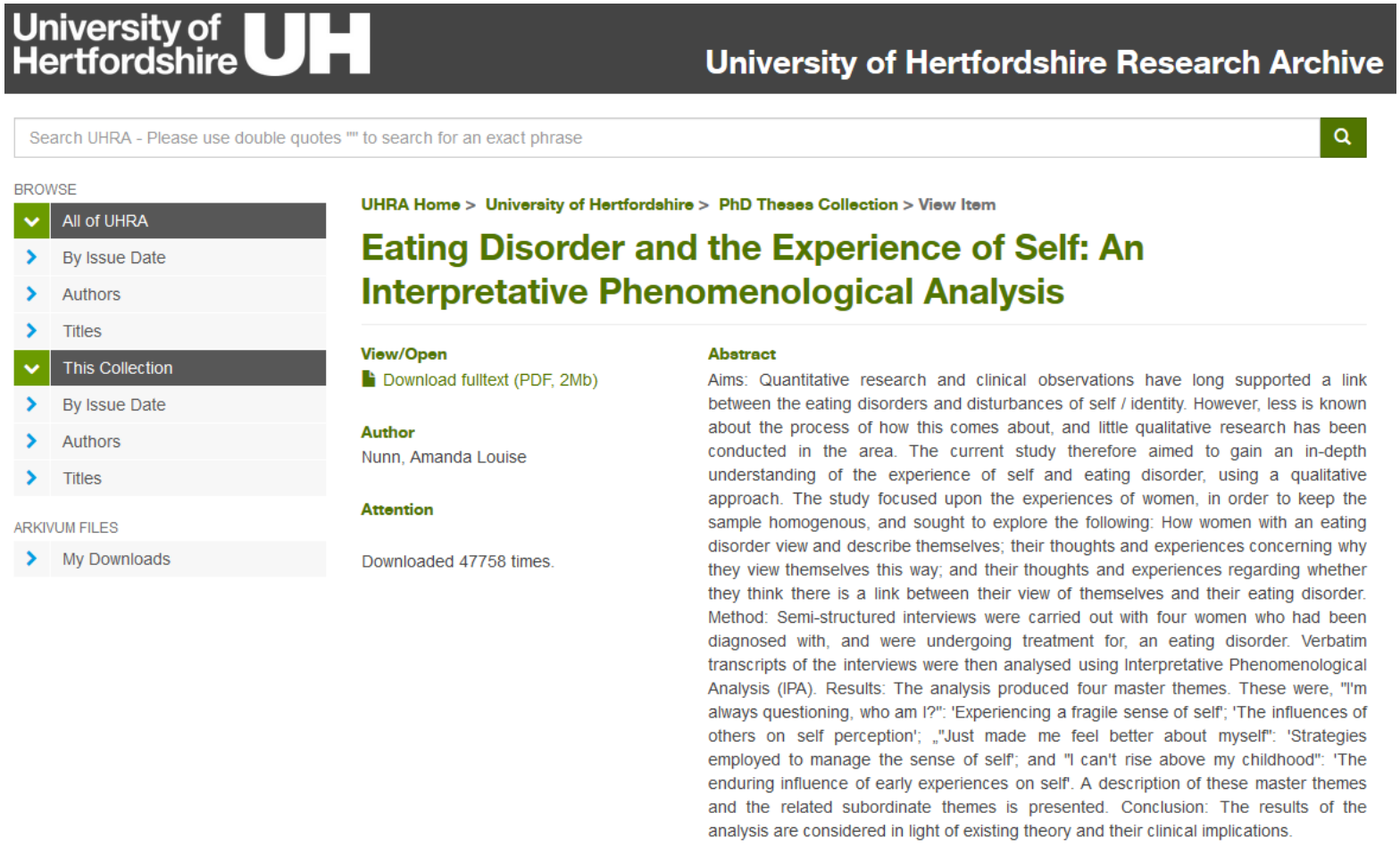

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Eating Disorder and the Experience of Self: An Interpretative Phenomenological Analysis

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Aims: Quantitative research and clinical observations have long supported a link between the eating disorders and disturbances of self / identity. However, less is known about the process of how this comes about, and little qualitative research has been conducted in the area. The current study therefore aimed to gain an in-depth understanding of the experience of self and eating disorder, using a qualitative approach. The study focused upon the experiences of women, in order to keep the sample homogenous, and sought to explore the following: How women with an eating disorder view and describe themselves; their thoughts and experiences concerning why they view themselves this way; and their thoughts and experiences regarding whether they think there is a link between their view of themselves and their eating disorder. Method: Semi-structured interviews were carried out with four women who had been diagnosed with, and were undergoing treatment for, an eating disorder. Verbatim transcripts of the interviews were then analysed using Interpretative Phenomenological Analysis (IPA). Results: The analysis produced four master themes. These were, "I'm always questioning, who am I?": 'Experiencing a fragile sense of self'; 'The influences of others on self perception'; „"Just made me feel better about myself": 'Strategies employed to manage the sense of self'; and "I can't rise above my childhood": 'The enduring influence of early experiences on self'. A description of these master themes and the related subordinate themes is presented. Conclusion: The results of the analysis are considered in light of existing theory and their clinical implications.

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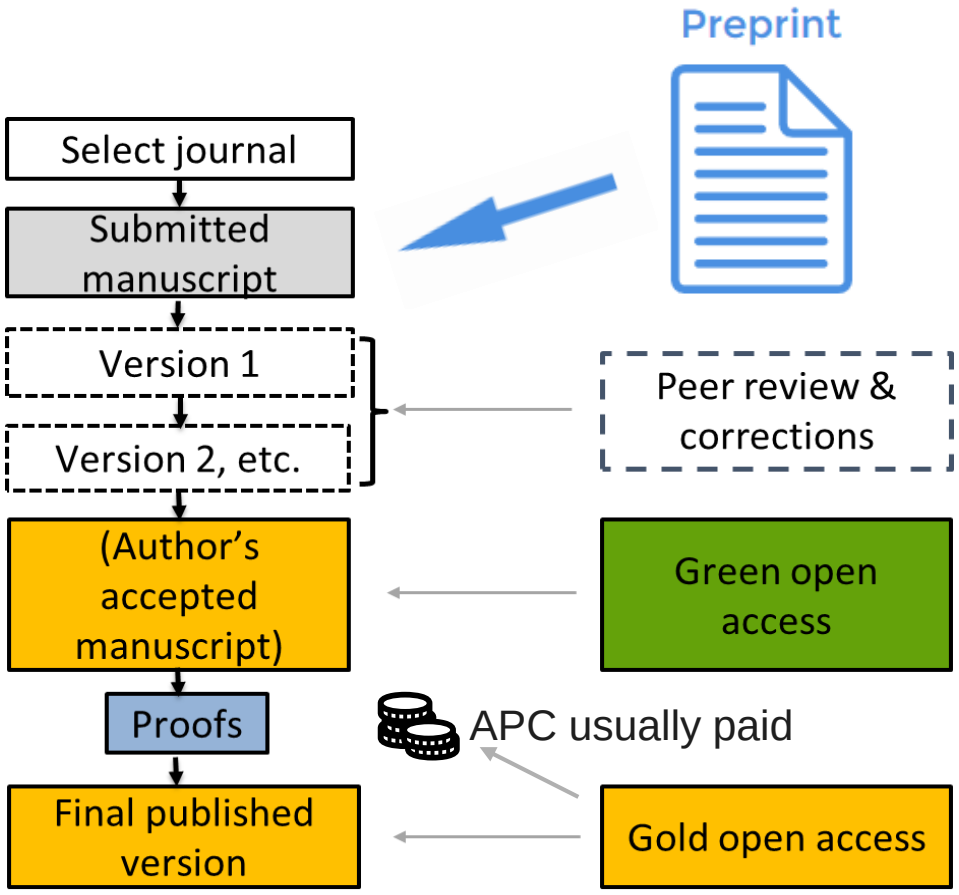

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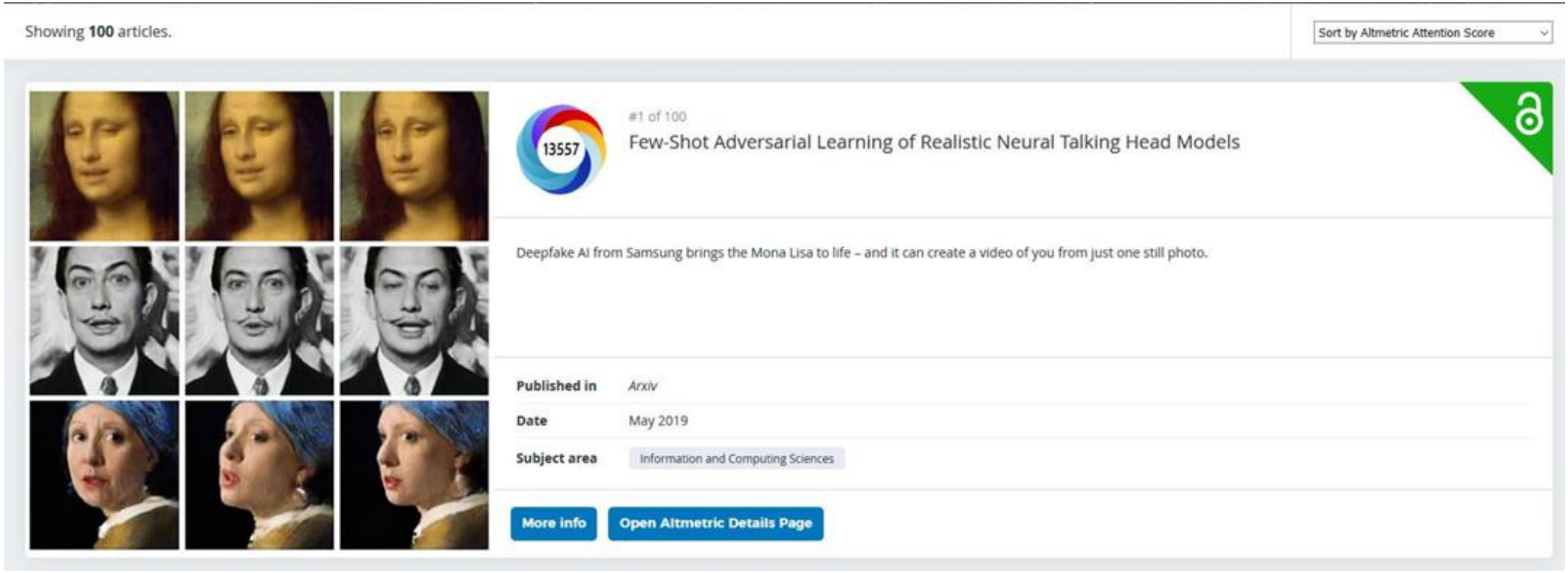

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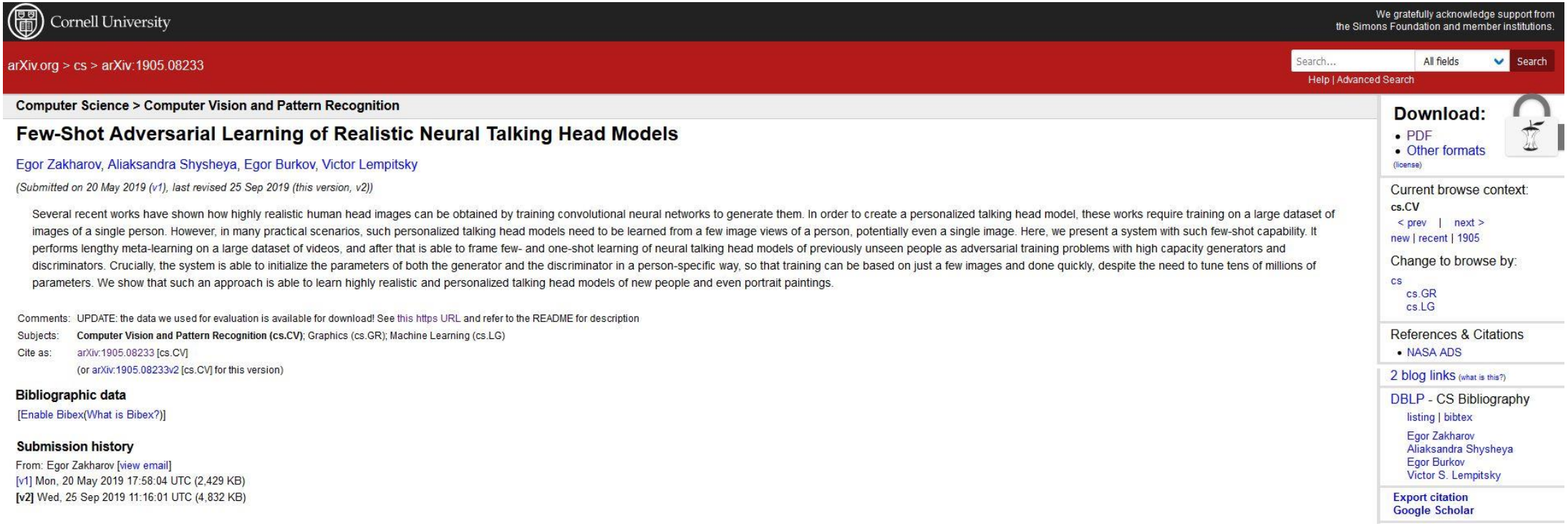

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Few-Shot Adversarial Learning of Realistic Neural Talking Head Models

Egor Zakharov, Aliaksandra Shysheya, Egor Burkov, Victor Lempitsky

(Submitted on 20 May 2019 (v1), last revised 25 Sep 2019 (this version, v2))

Several recent works have shown how highly realistic human head images can be obtained by training convolutional neural networks to generate them. In order to create a personalized talking head model, these works require training on a large dataset of images of a single person. However, in many practical scenarios, such personalized talking head models need to be learned from a few image views of a person, potentially even a single image. Here, we present a system with such few-shot capability. It performs lengthy meta-learning on a large dataset of videos, and after that is able to frame few- and one-shot learning of neural talking head models of previously unseen people as adversarial training problems with high capacity generators and discriminators. Crucially, the system is able to initialize the parameters of both the generator and the discriminator in a person-specific way, so that training can be based on just a few images and done quickly, despite the need to tune tens of millions of parameters. We show that such an approach is able to learn highly realistic and personalized talking head models of new people and even portrait paintings.

Comments: UPDATE: the data we used for evaluation is available for download! See this https URL and refer to the README for description

Subjects: **Computer Vision and Pattern Recognition (cs.CV)**; Graphics (cs.GR); Machine Learning (cs.LG)

Cite as: arXiv:1905.08233 [cs.CV]

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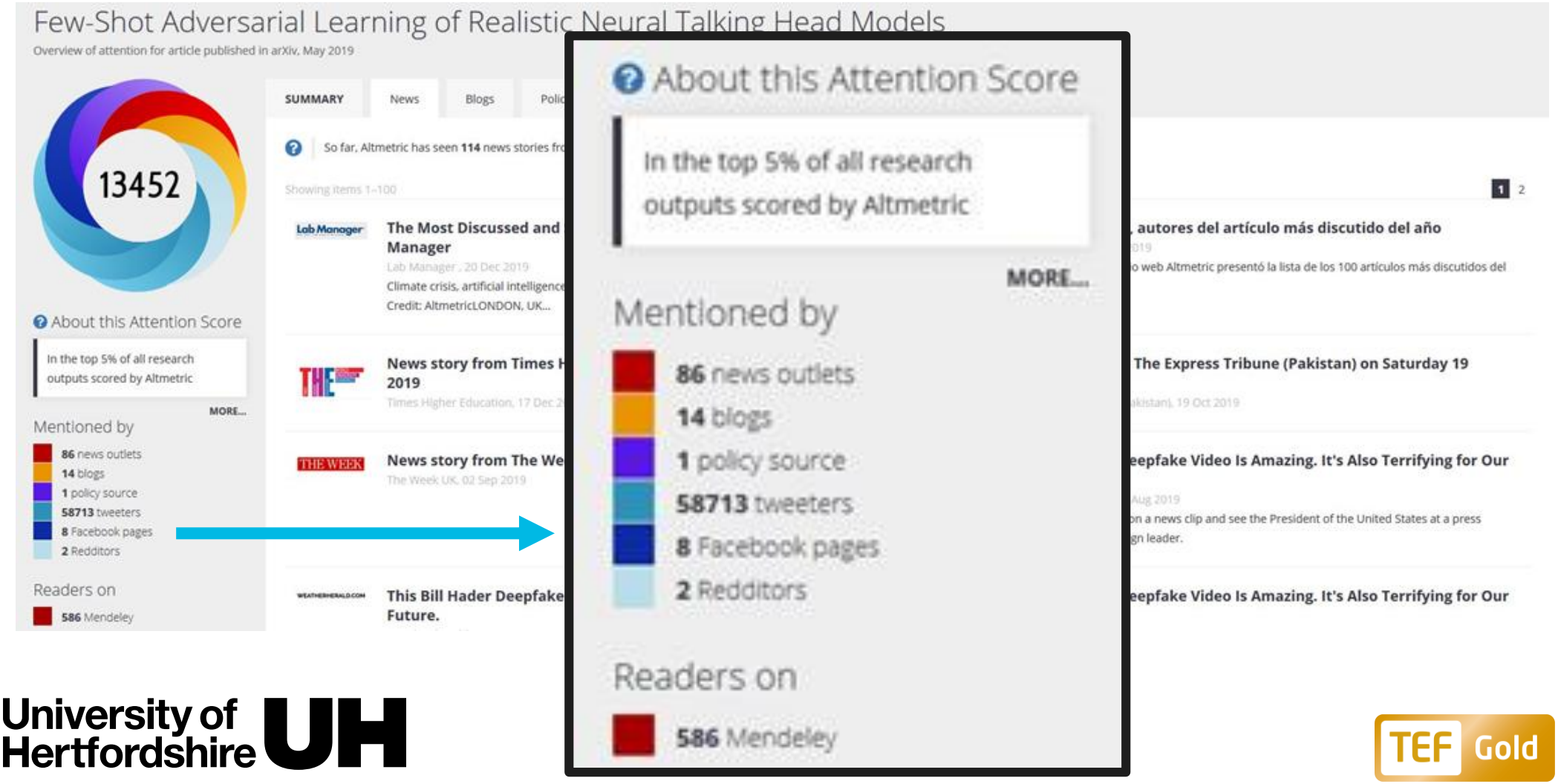

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1. Piwowar, H. A., Day, R. S., & Fridsma, D. B. (2007). Sharing detailed research data is associated with increased citation rate. *PLoS ONE, 2*(3) doi:10.1371/journal.pone.0000308

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3. Colavizza, G., Hrynaszkiewicz, I., Staden, I., Whitaker, K., & McGillivray, B. (2019). The citation advantage of linking publications to research data. [Preprint]. Available at arXiv https://arxiv.org/abs/1907.02565.

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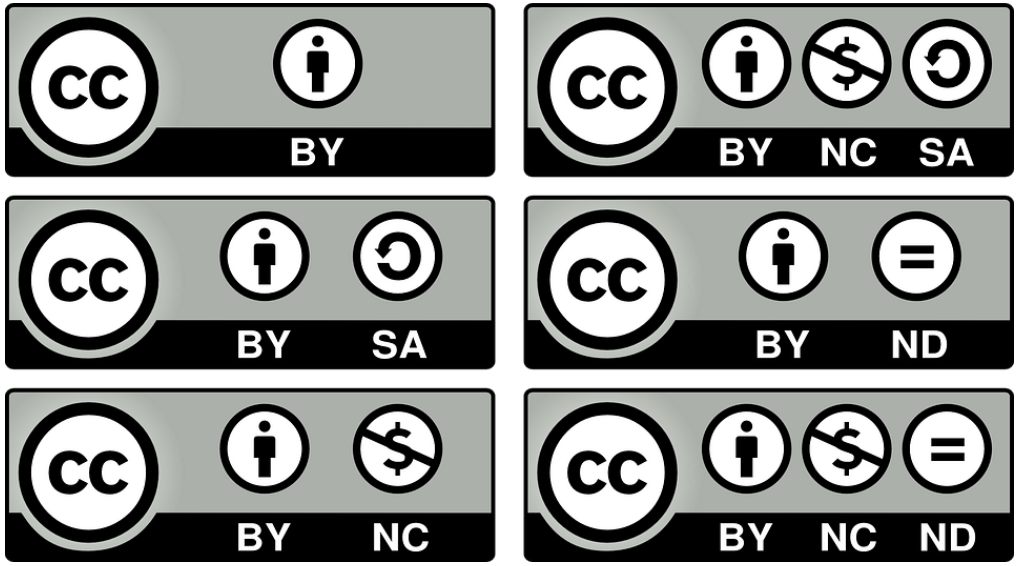

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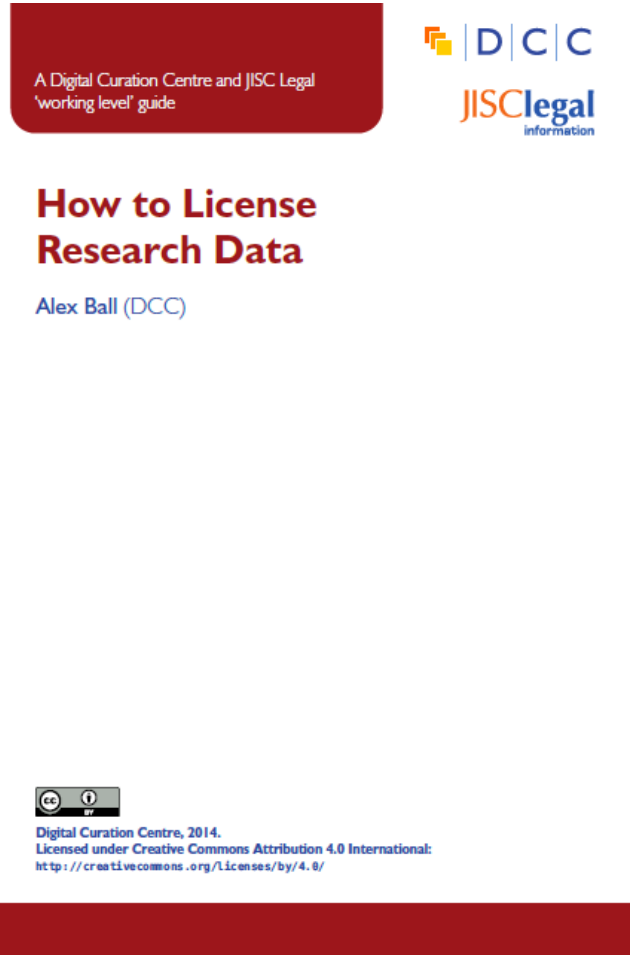

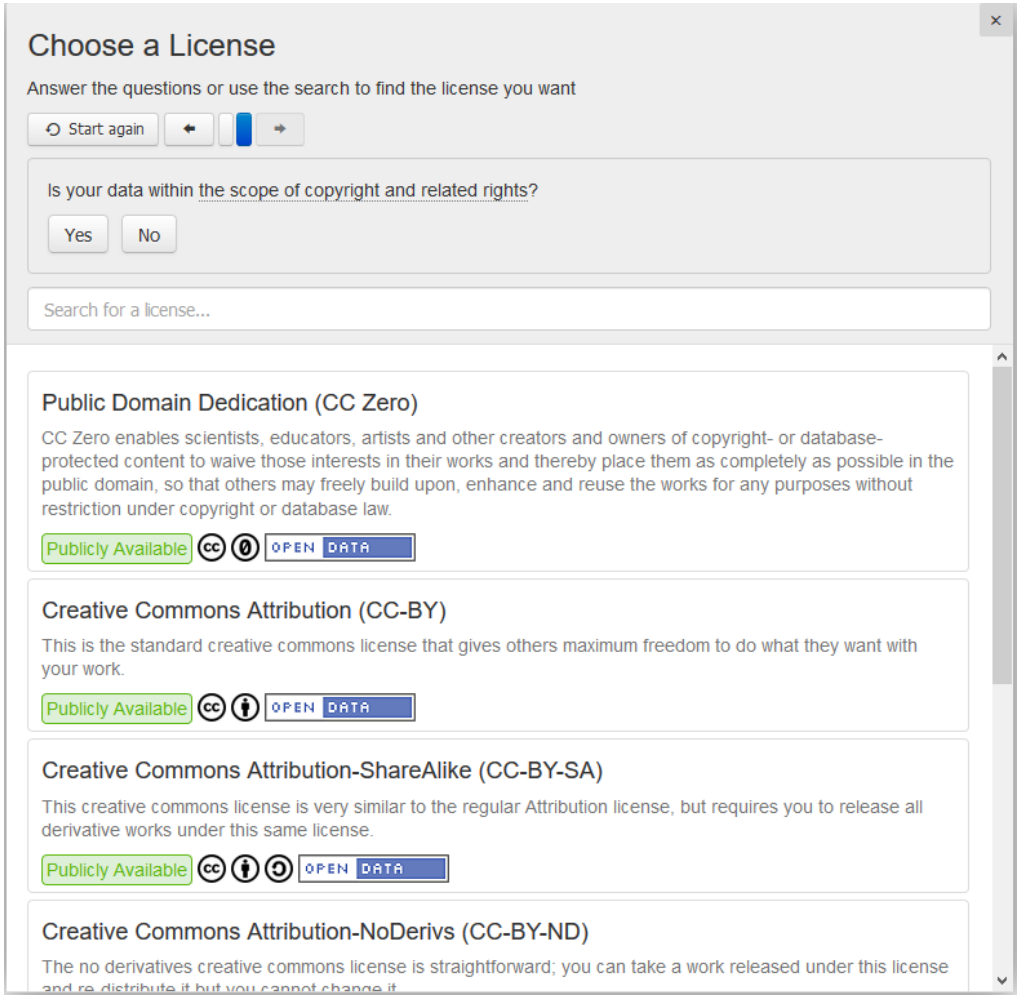

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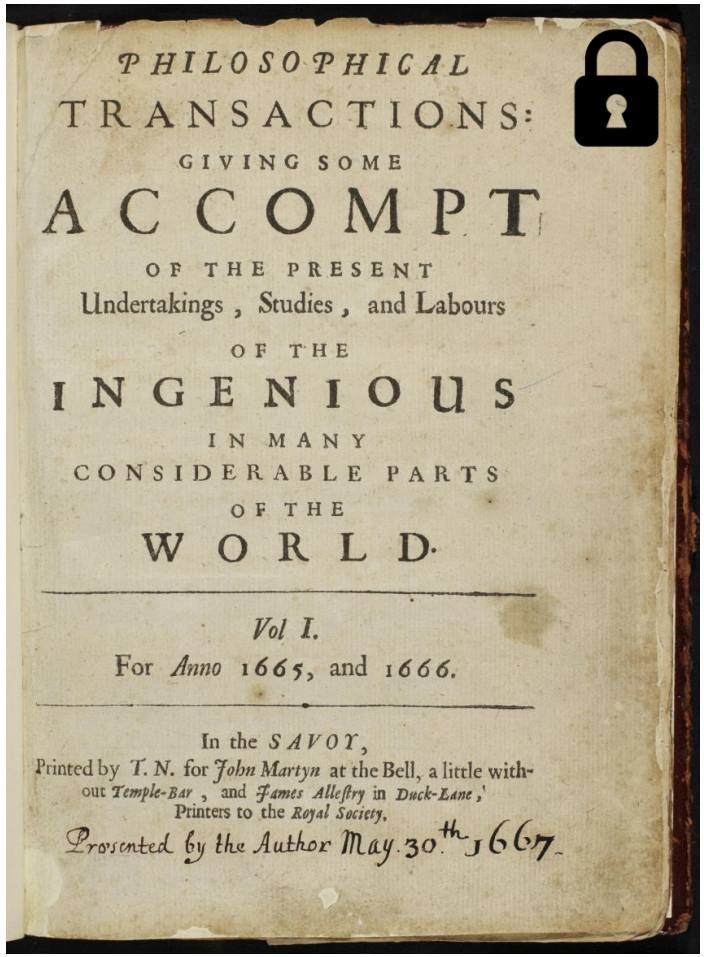

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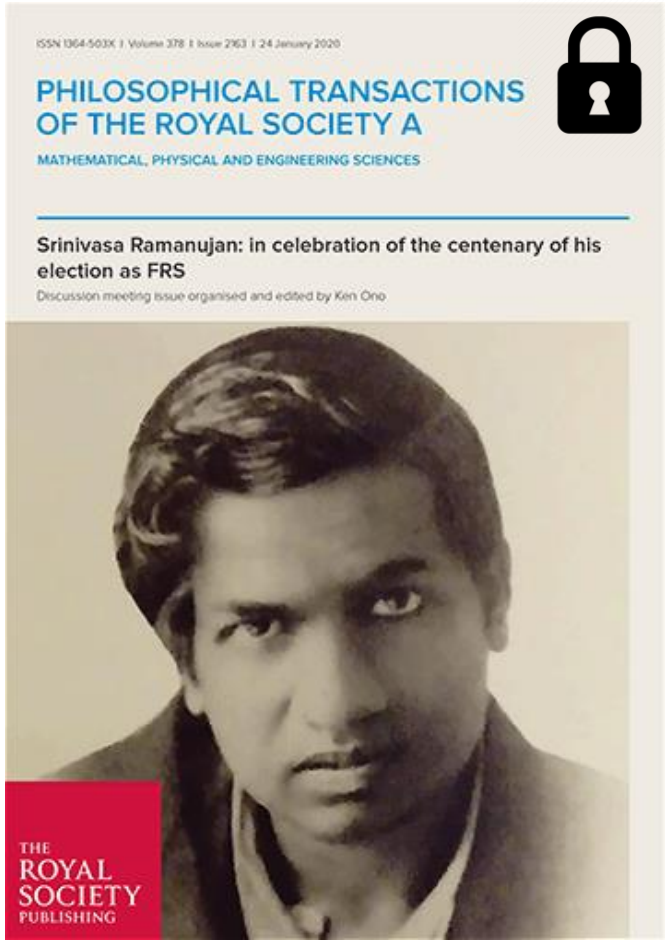

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Questions

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