Sverleaf

Collaborative Writing and Publishing

Using Overleaf to Supercharge Research Presentation

Jack Naylor - University of Sydney

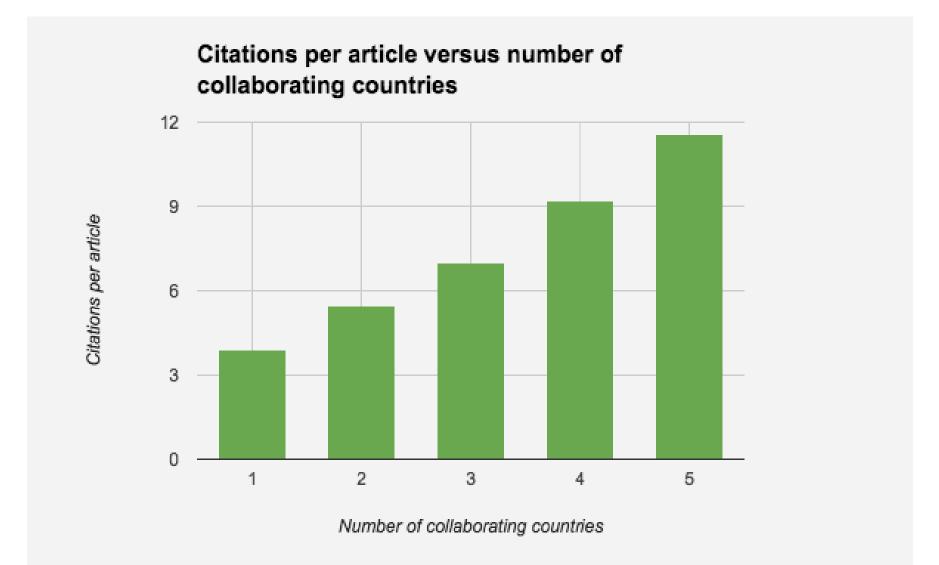
www.overleaf.com

Global scientific collaboration is increasing



This is a good thing for research visibility





But...collaboration can be frustrating

- Multiple versions of the same document
- Long email chains
- Formatting & typesetting
- Maintaining references
- Long revision cycles

"FINAL".doc













FINAL_rev.6.COMMENTS.doc

FINAL_rev.8.comments5.







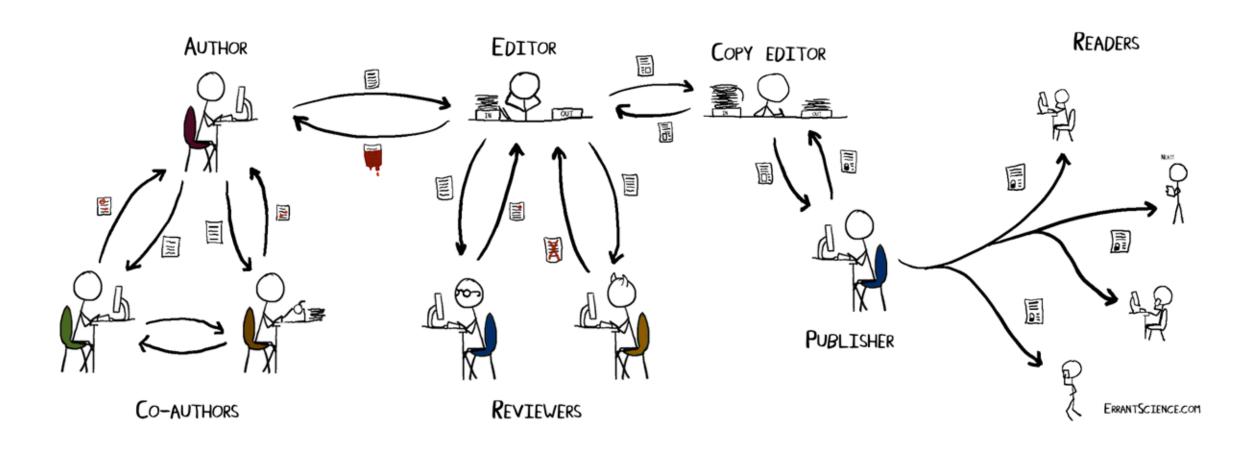


FINAL_rev.18.comments7. corrections9.MORE.30.doc

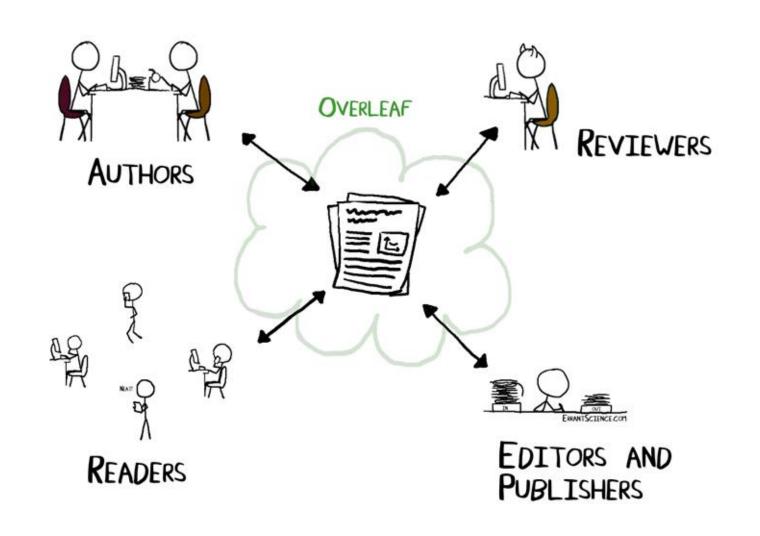
FINAL_rev.22.comments49. corrections.10.#@\$%WHYDID ICOMETOGRADSCHOOL????.doc



Traditional workflows create many different versions of documents which often sit in silos



Overleaf provides one master version for collaboration by all



36 Introduction

38 Gallium Nitride (GaN) High Electron Mobility Transistors (HEMT) on SiC are now recognized as good candidates for the development of a number of RF applications and notably Power Amplifiers (PA) for telecommunications and radars, due to their high breakdown voltage, their high cut-off frequency as well as their high temperature capabilities. However they are still subject to parasitics effects such as thermal effects and especially trapping effects. One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor versus an increasing RF input power. Those trapping effects have been extensively studied using a number of techniques such as pulsed measurements, load-pull measurements as well as frequency dispersion measurements. At the same time, models have been proposed that take those effects into account ## {5296056, Leoni2001, 5516843], and while the effects of traps are well taken into account in CW conditions, their impacts on

Preview Manual

Auto

Modeling of Trap Induced Dispersion of Large Signal Dynamic Characteristics of GaN HEMTs

O. Jardel*, S. Laurent†, T. Reveyrand†, R. Quéré†, P. Nakkala†, A. Martin† S. Piotrowicz*, M. Campovecchio†, S.L. Delage* * III-V Lab, route de Nozay, 91461 Marcoussis Cedex, France [†] XLIM, 7 rue Jules Valles, 19100 Brive-la-gaillarde, France olivier.jardel@3-5lab.fr

Abstract-We propose here a non-linear GaN HEMT model for CAD including a trapping effects description consistent with both small-signal and large-signal operating modes. It takes into account the dynamics of the traps and then allows to accurately model the modulated large signal characteristics that are encountered in telecommunication and radar signals. This model is elaborated through low-frequency S-parameter measurements complementary to more classical pulsed-IV characterizations, A 8x75µm AlInN/GaN HEMT model was designed and particularly validated in large-signal pulsed RF operation. It is also shown that thermal and trapping effects have opposite effects on the output conductance, thus opening the way for separate characterizations of the two effects.

I. INTRODUCTION

Gallium Nitride (GaN) High Electron Mobility Transistors (HEMT) on SiC are now recognized as good candidates for the development of a number of RF applications and notably Power Amplifiers (PA) for telecommunications and radars, due to their high breakdown voltage, their high cut-off frequency as well as their high temperature capabilities. However they are still subject to parasities effects such as thermal effects and especially trapping effects. One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor versus an increasing RF input power. Those trapping effects have been extensively studied using a number of techniques such as pulsed measurements, load-pull measurements as well as frequency dispersion measurements. At the same time, models have been proposed that take those effects into account [1], [2], [3], and while the effects of traps are well taken into account in CW conditions, their impacts on dynamic large signal characteristics remain difficult to understand. They manifest themselves under modulated signals such as RF pulses or telecommunications signals. In this paper we propose to investigate the dynamics of those trapping effects using large signal pulsed load pull measurements as well as low frequency dispersion measurements. It will be shown that a consistent nonlinear model can be obtained that allows to describe the full dynamic behavior of GaN transistors. The paper is organized as follows: Section II describes the theoretical impact of traps on the average current obtained under pulsed load pull conditions. Section III presents the measurements performed on an AllnN/GaN 8x75µm HEMT and the results

II. THE IMPACT OF TRAPS ON SIGNAL CHARACTERISTICS

SIGN UP

up-to-date and saved

One convenient way to identify the impact of trapping effects is to monitor the average drain current of the transistor versus an increasing RF input power. It has already been reported in [1] and [3] that this drain current under class-AB conditions decreases as the input power increases, contradicting the expected characteristics. Clearly this behavior cannot be explained by thermal behavior as far as the channel temperature sinks when the power increases and would leads, at least for moderate powers, to an average drain current enlargement.

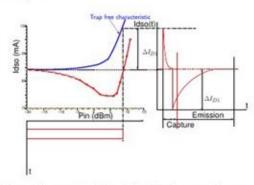


Figure 1. Representation of the mechanism induced by traps on the average drain current.

Pulsed RF measurements were performed under DC bias on AlGaN/GaN and InAlN/GaN HEMTs of 8x75x0.25µm2 for a large number of output loads. For all devices, we obtain the same shape of the average drain current which is shematized in Figure 1. The average current decrease is due to the trap capture, which increases alike to the gate and drain voltage excursions versus the input power for a CW measurement. Indeed, the number of ionized traps is roughly proportional to the maximum value of the drain-source voltage, because of the disymmetry of the capture and emission time constants [4]. When the RF power is pulsed, the average drain current



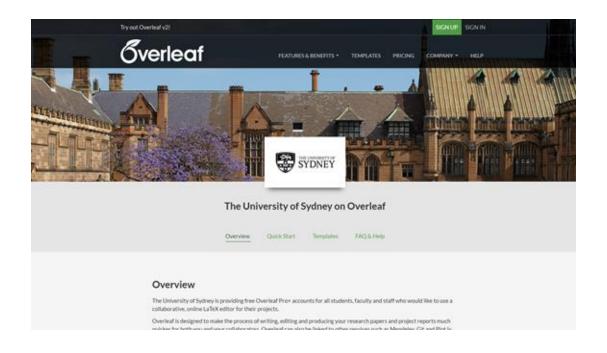
Now serving a community of over two million authors from 180 countries worldwide

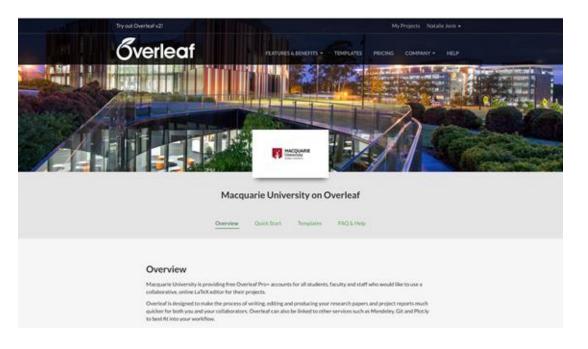






Adopted by a growing number of institutions around the world, including the University of Sydney and Macquarie University





https://www.overleaf.com/edu/sydney

https://www.overleaf.com/edu/macquarie

Case study example: Overleaf at Stanford University

- 450% increase in usage in the first year the institutional solution was adopted
- Now used by over **7,000 students, researchers, staff and faculty**

"Overleaf has been a huge success at Stanford.

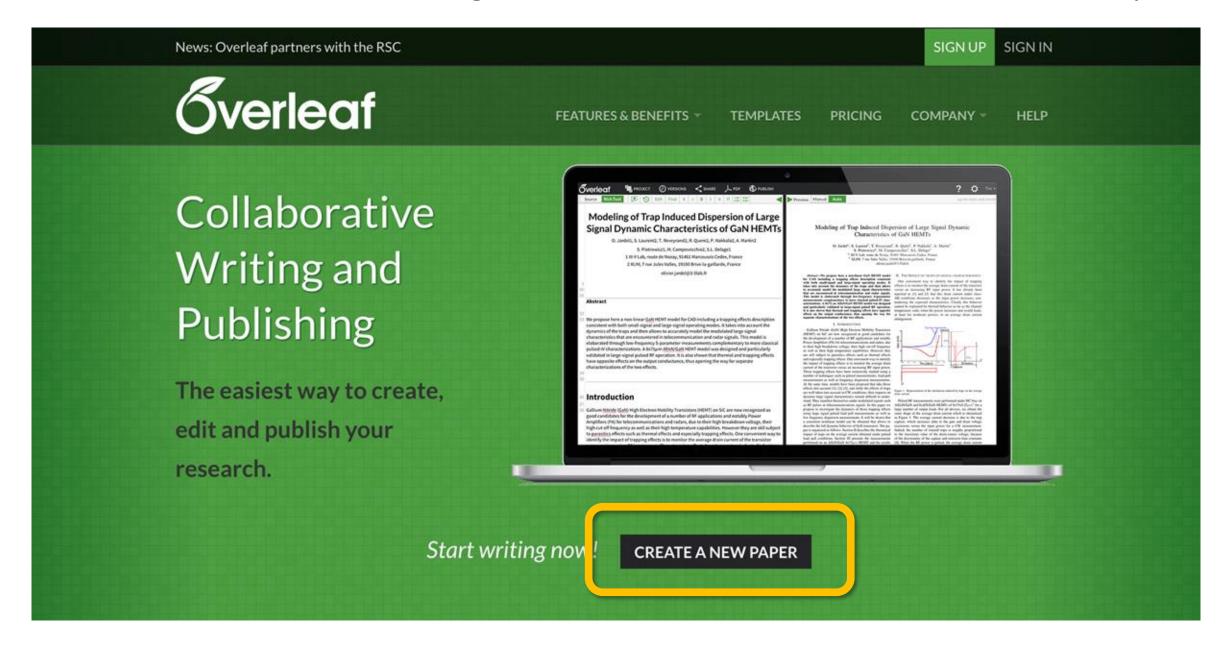
We provide Overleaf Pro accounts to all students, faculty and staff and the uptake and feedback has been tremendous!"



Helen Josephine
Head of the Terman
Engineering Library, Stanford



How does it work? Start writing with one click, or choose from 3,000+ templates

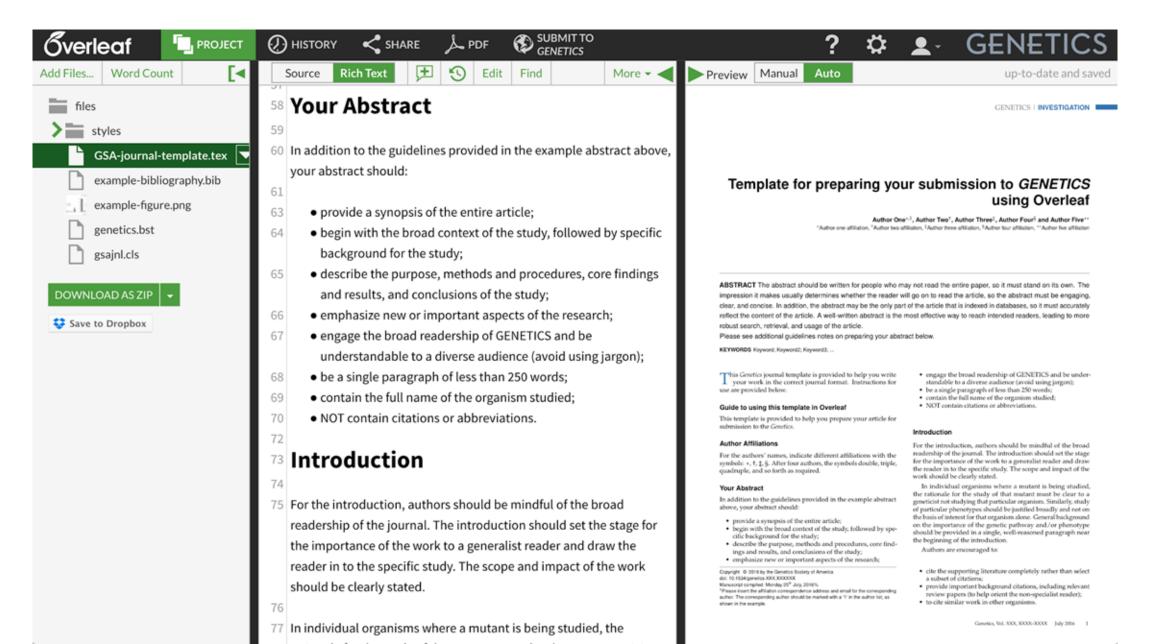


Templates linked directly from publisher/journal websites

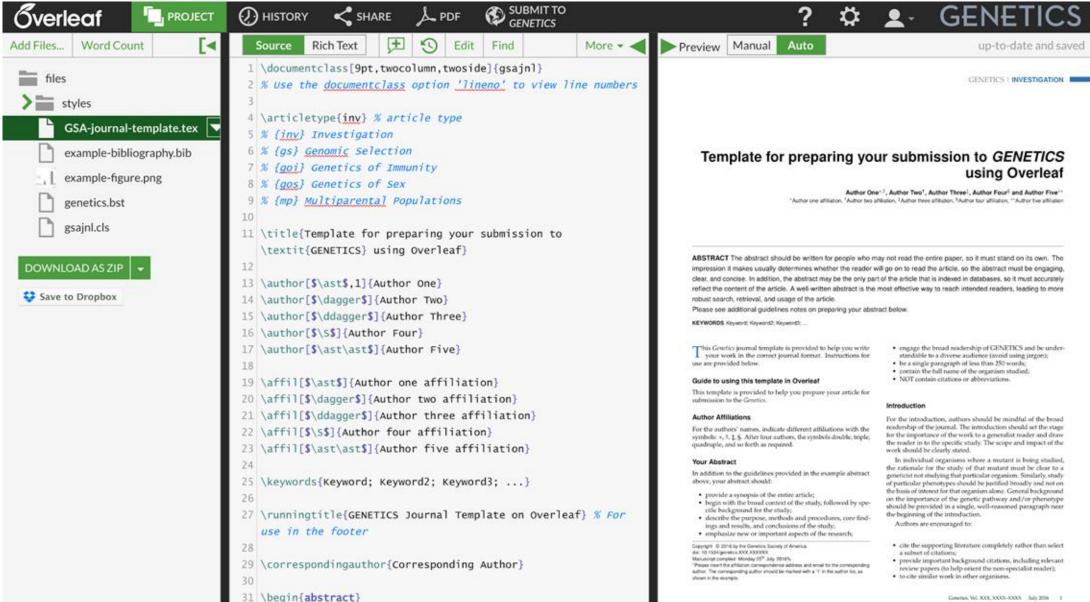


Proceedings of the National Academy of Sciences of the United States of America CURRENT ISSUE // ARCHIVE // NEWS & MULTIMEDIA // AUTHORS // ABOUT COLLECTED ARTICLES // BROWSE BY TOPIC // EARLY EDITION Current Issue FOR AUTHORS Submitting LaTeX Files **Email Alerts** Subscribe Information for PNAS is excited to announce our latest LaTeX template is available on Overleaf. RSS Authors Overleaf allows authors to easily create their submissions using a PNASformatted LaTeX template. Authors will have the option to download a PDF (best for initial submissions) or a .zip file that can be uploaded into the PNAS **How to Submit Your** Manuscript and submission system. Don't Miss Figures Thinking of submitting your next If you experience any issues when creating your manuscript, support is provided paper to PNAS? Learn tips in our by Overleaf at the contact information below, or you can contact the PNAS office PNAS tutorial videos. Submit an Article for assistance. We are pleased to provide this new service to authors and encourage our LaTeX Other PNAS Media **Author Frequently Asked Questions** users to try it out. Image Gallery Overleaf: Video Library Preparation of Follow Us on Twitter Revised Submissions Email: support@overleaf.com Overleaf Support Contact Form Find Us on Facebook For Reviewers [05/16] **▼ MOST READ** MOST CITED

Edit on the left, see the typeset version on the right

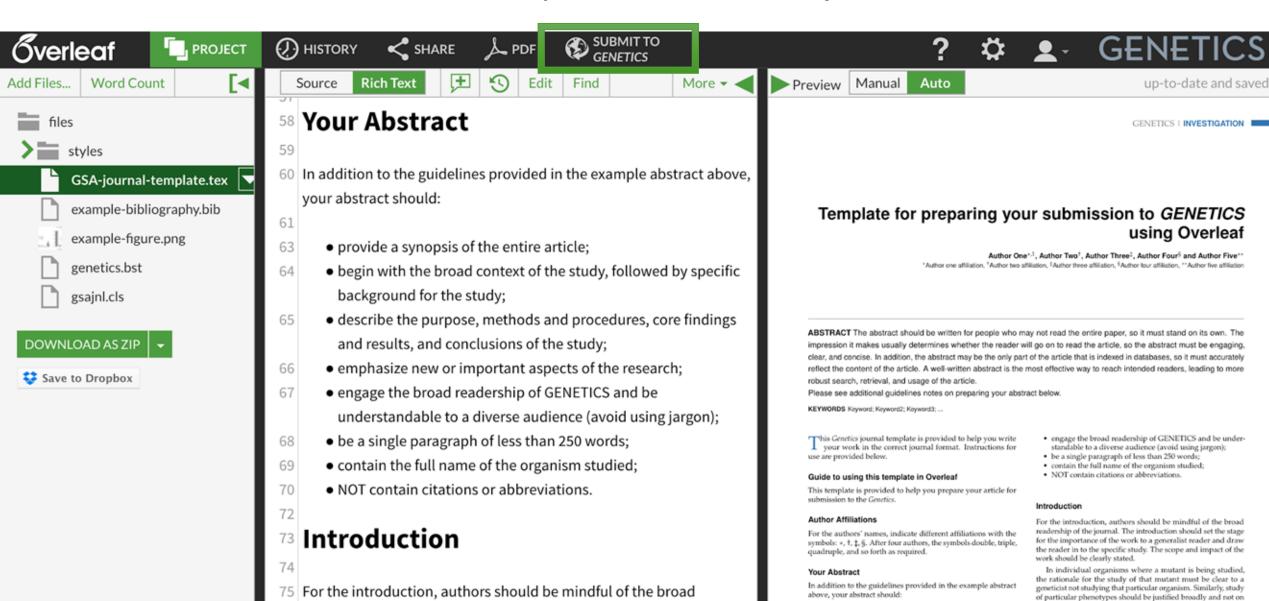


Edit underlying LaTeX source, if you like



37 The abstract should be written for people who may not read

Submit directly from Overleaf to journals



readership of the journal. The introduction should set the stage for

the importance of the work to a generalist reader and draw the

the beginning of the introduction.

provide a synopsis of the entire article;

cific background for the study;

· begin with the broad context of the study, followed by spe-

· describe the purpose, methods and procedures, core find-

the basis of interest for that organism alone. General background

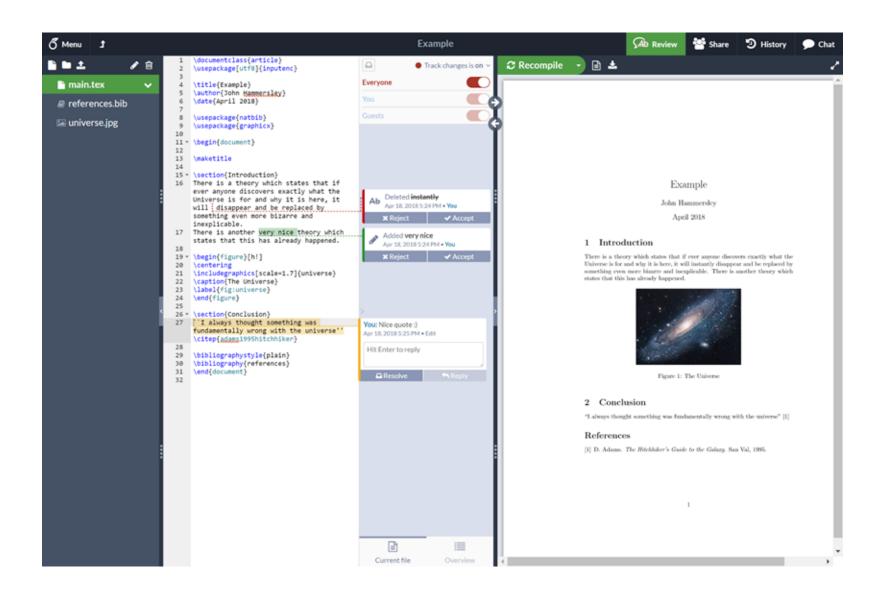
on the importance of the genetic pathway and/or phenotype

should be provided in a single, well-reasoned paragraph near

Some big news last summer!!



Overleaf v2 now in public beta! Try it at v2.overleaf.com





Find out more at:

www.overleaf.com



Jack Naylor - Mechanical Engineering/Physics Student jack.naylor@sydney.edu.au