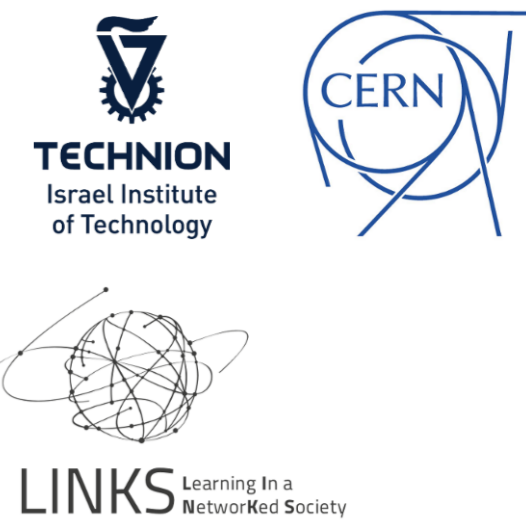# Footprints of Fascination: Digital Traces of Public Engagement with Particle Physics on CERN's Social Media Platforms

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Introduction
Although the scientific community recognizes that its communication with the public may shape civic engagement with science, few studies have characterized how this communication occurs online.
Social media plays a growing role in this engagement, yet it is not known if or how different platforms support different types of engagement.

Research Questions
1. How do users engage with scientific information on different social media platforms, when controlling for content?
2. What are the characteristics of the most popular scientific information items on social media in terms of user interactions?

Method
User interactions with almost identical items on five of CERN's social media platforms (Facebook, Twitter English, Twitter French, Google+ and Instagram) were quantitatively compared over an eight-week period. Dependent variables included likes, comments, shares, click-throughs, and time spent on CERN's site.
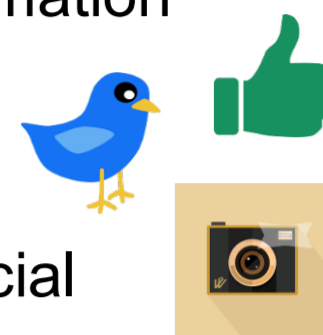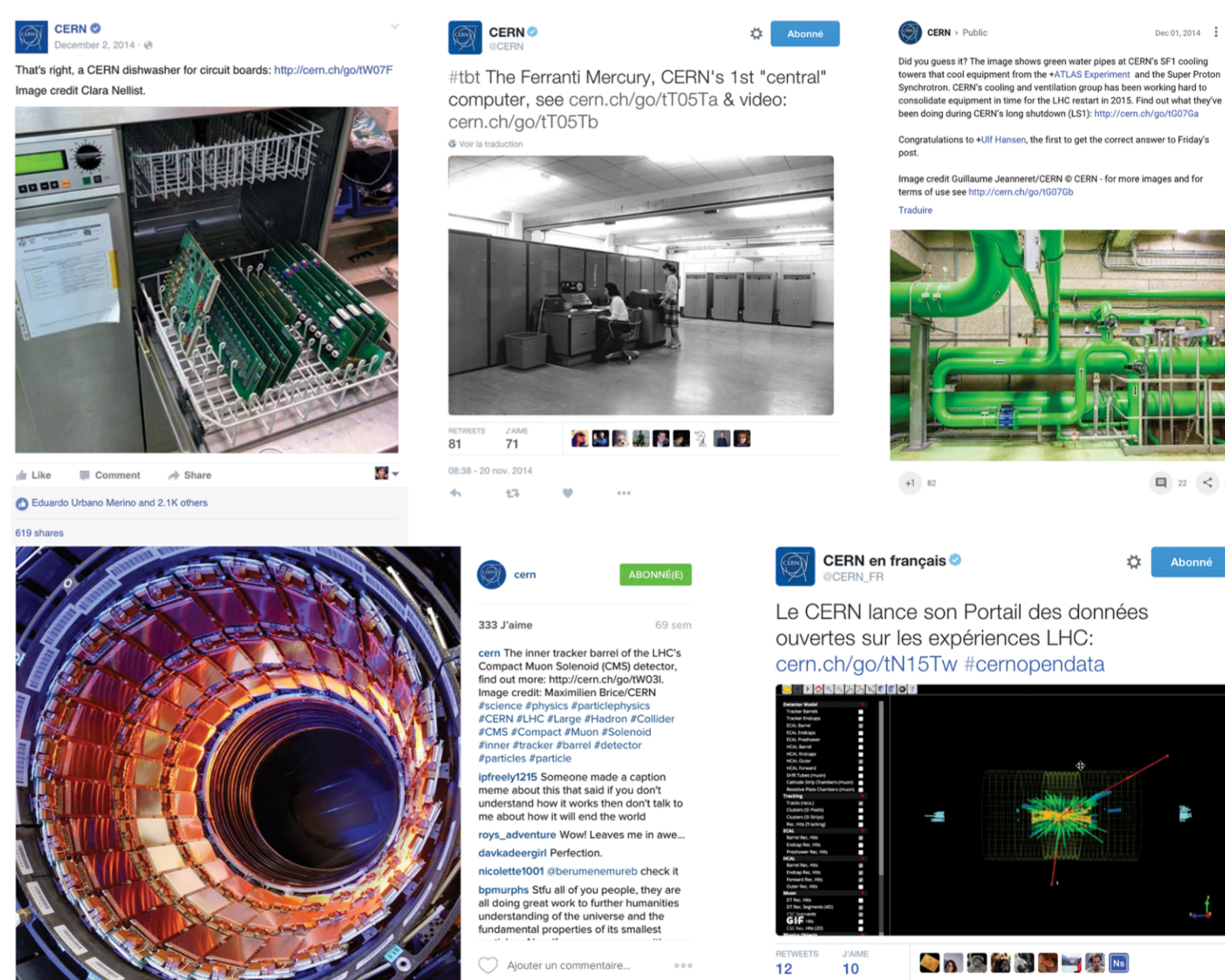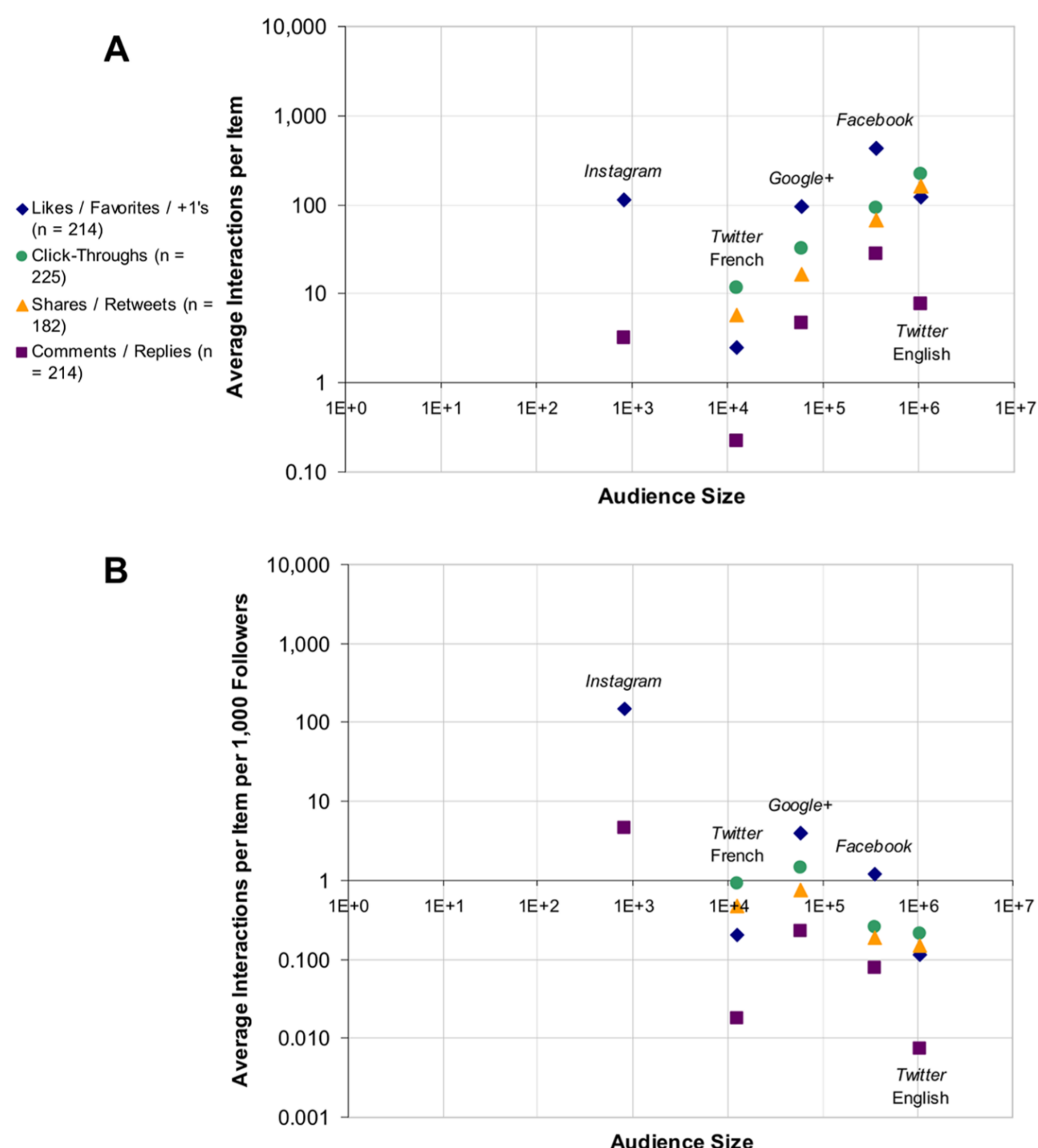
Selected Findings

Fig 2. Examples of the five social media platforms and four content types studied.
Top row, left to right: a "Wow" item (Facebook); a "Throwback Thursday" item (Twitter English); a "Guess What It Is" item (Google+).
Bottom row, left to right: a "Wow" item (Instagram); a news item (Twitter French).

Fig 1. (A) As audience size of a social media platform grows, the total rate of engagement with content tends to grow as well. (B) However, per user, engagement tends to decline with audience size. Perhaps in new accounts, "early adopters" might tend to be more engaged users. Also, large audiences might tend to include many inactive followers.
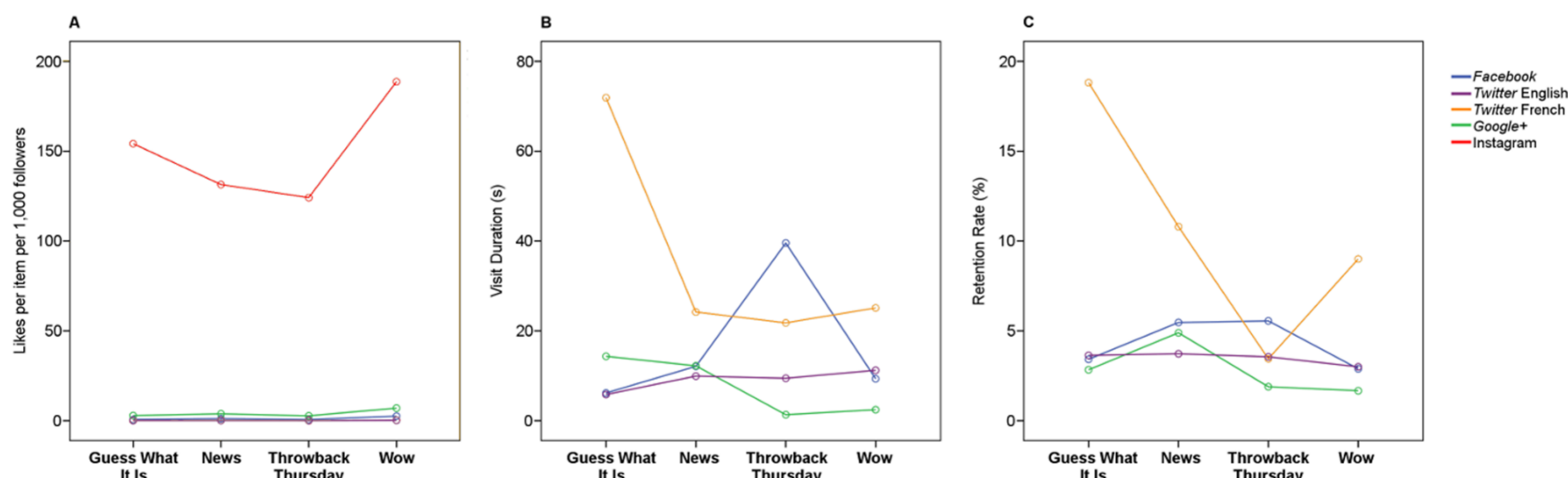

Fig 3. (A) The combined effect of "Wow" images and the Instagram platform yields many more likes than any other combination of platform and item type (B) Among users who clicked on links, Twitter French users uniquely tended to spend much more time on pages that Guess What It Is links led to than any other user on any other platform or item type. (C) This interaction is also reflected in retention rate data.

Discussion
To some extent, engagement is similar irrespective of platform, but in some respects it differs. We argue that these differences can be attributed to (1) Platform effects; (2) Audience effects; and (3) Content effects. To our knowledge, this study provides the first cross-platform characterization of public engagement with science on social media. Although findings are focused on particle physics, they may serve to benchmark social media analytics for other domains as well.