

## Jean Bourgain: In memoriam

Zeev Rudnick, June 1 2019

I am here to share some brief memories of Jean. I collaborated with him over a stretch of about 8 years. Here are two vignettes from our interactions.

### Where is the beef

My first significant interaction with him came when I was invited to give the colloquium at the Princeton math department around 2005. I spoke about lattice points, and was surprised to see him in the audience, as he tended to ration the amount of talks that he attended. After the lecture he came up to me, smiled and said "I was hoping for more beef"... Meaning that he wanted to see the gory details. I explained that I wanted to keep the audience awake, which made him laugh. He did not share this approach. Once after a particularly demanding lecture of his, observing the audience's glazed looks, he sheepishly told me that he clearly did not have enough practice at teaching calculus, or anything else for that matter. As most of you will know, Jean's brilliance was recognized early on, and he did not have to do any real teaching for most of his career.

### What is a draft

We started to work together during a two-year sabbatical that I spent at the Institute in 2008-10. Early on in my stay, I had a discussion with Peter Sarnak and quickly discovered a cute result about a restriction theorem for eigenfunctions of the Laplacian on the torus. The following day Jean showed up in my office, saying that he heard about it from Peter and wanted to see it, as he had thought of related matters. I quickly realized that he meant that he had already found the result, but was too polite to say so explicitly. In any case, we started discussing various variations of the idea, which led to a long collaboration.

When working on a project we quickly settled into a routine where we would take turns. Jean would come into the office after lunch and start chewing on the problem. Around 3 am he would send me a scan of his handwritten notes. I would get those upon waking up, and after putting my kids on the school bus at Weyl Lane, would go to the office to face the challenge of understanding the notes and working on them, sometimes (not often) making my own little progress, which I would tell him about or send by email before going to sleep. I found this an exhausting process, as it was all I could do to keep up with even a small proportion of his ideas.

All too quickly, Jean would resolve the problem, cut and paste together his hand written notes (I mean **physically** cut and paste) into a manuscript, complete with hand-drawn figures, and declare victory. These he would give to his long-time assistant, Elly Gustafsson, to type. The first time that I got such a manuscript I blanched, and trying to be diplomatic, told Jean that this was a good first draft. Jean looked at me, smiled, and said "What is a draft"? My challenge became to intercept the notes before Elly got to them, or at worst ask her for her TeX files, which I would work on until satisfied with the exposition (top down rather than bottom up). This process did not interest Jean at all, and he was quite happy to let me waste my time on polishing the paper while he turned his attention to other things.

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Jean was a prince among men. As a mathematician, he combined sheer strength with an uncanny and enviable ability to maintain concentration for long stretches of time. He is sorely missed.