

Re: OT raibow

Source: <http://coding.derkeiler.com/Archive/Perl/comp.lang.perl.misc/2007-12/msg00059.html>

- *From:* Ilya Zakharevich <nospam-abuse@xxxxxxxx>
 - *Date:* Mon, 3 Dec 2007 00:42:15 +0000 (UTC)
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[A complimentary Cc of this posting was sent to Joost Diepenmaat

<joost@xxxxxxxx>], who wrote in article <475203a8\$0\$20387\$e4fe514c@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>:

On Sun, 02 Dec 2007 00:35:53 +0000, Ilya Zakharevich wrote:

A rainbow contains VERY mixed colors. It's a wonder that these colors are distinguishable by eye at all; they are very low saturation (even if the background is very dark – which it usually is not).

Getting further and further off-topic.

I am under the impression that a rainbow contains/is a "frequency sweep" of visible light, which would mean that the colors aren't mixed – at every point you'd have light of a single frequency.

It is very very far from being true. Looking at the picture of ray tracing through a droplet, you can see that there is A CONCENTRATION of rays going out near a certain cone; as with "the usual `fold' concentrators" (see catastrophe theory) the corresponding density will be about $\text{const}/\sqrt{A-a_0}$; here A is the angle with the direction to the sun, and a_0 the angle at the vertex of the cone. a_0 depends slightly on the frequency of light.

Therefore, looking in the particular direction A , you get density of rainbow light with frequency F as $\text{const}/\sqrt{A - a_0(F)}$; this may be rewritten as something "about $\text{const}/\sqrt{F - F_0}$ ". "Single frequency" conjecture corresponds to distribution with density concentrated at one particular frequency F_0 .

Since dependence of a_0 on F is very small, this "about" above should give quite good an approximation; thus the distribution is "very wide", not "very narrow".

Hope this helps,
Ilya

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