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(Die Zahlen in eckigen Klammern sind die Seitenzahlen)

[821] Pity the unlucky judge who draws this case on the docket. The case-file is replete with the infinite and the unknowable. The facts are, quite literally, more complex than anything on Earth. Help is everywhere, but trustworthiness is in short supply. For every potential expert witness has a personal stake in the matter—whether it is a desire to maintain a viable career in the sciences, or a fear of falling into an astronomical abyss.

[829] Whatever the outcome, the LHC will not be the final word in physics experimentation.
Unless, of course, it destroys the planet.

[831f] Francesco Calogero [ein renommierter Teilchenphysiker] criticized the findings of experts on the issues of RHIC [Relativistic Heavy Ion Collider, Brookhaven] safety, pointing to bias, a lack of scientific objectivity, and an overarching preoccupation with the public-relations consequences of what is said (…):

> I am also somewhat disturbed by what I perceive to be the lack of candour in discussing these matters of many people—including several friends and colleagues with whom I have had private discussions and exchanges of. Many, indeed most, of them seem to me to be more concerned with the public relations impact of what they, or others, say and write, than in making sure that the facts are presented with complete scientific objectivity.

[834] there is essentially only one kind of catastrophe that all particle physicists take seriously (…): project cancellation.

[836] The lesson of the SSC [Superconducting Super Collider, das Beschleunigerprojekt in den USA, das vom Kongress 1993 zur Konsternation der Physikergemeinde gestoppt wurde] was clear. To keep projects safe from cancellation in the future, physicists would have to pull together (…)

[838] In 1999, when questions floated in the media about accelerator-produced black holes, physicists issued an assurance that no particle collider in the foreseeable future would have enough power to accomplish such a feat.
That conclusion came out of analysis performed by the authors of the Busza report, which was done in anticipation of the commencement of RHIC operations. (…) The Busza team found that the forces created by the RHIC were orders of magnitude too small to possibly create a black hole.

[839] But the Busza team, Calogero, and the rest were making an assumption in their calculations, an assumption that just about anyone would think is entirely reasonable. They assumed that we live in a four-dimensional world—with three dimensions of space (length, width, and height) and one dimension of time.
In 2001, a new theory concerning black holes emerged. Steven B. Giddings, a physicist from the University of California, Santa Barbara, (…) suggested that if space had extra hidden dimensions—beyond the familiar four—then the power to make black holes might well be within grasp. In particular, Giddings suggested that the LHC, when it comes oholes at the rate of one every second.

[840] CERN published its safety study in 2003. (…) the report conceded that, under the new theory, black holes "will be produced." Nonetheless, the study reported that LHC-produced black holes could not be dangerous because they would rapidly evaporate.

[842] [William Unruh von der Uinversity of British Columbia] wrote a paper theorizing that black holes might not evaporate.

[845] In 2007, with the LHC getting closer to completion, media and citizen inquiries into the LHC's safety led CERN management to set up the LHC Safety Assessment Group, known as "LSAG." (…) All five members of the group were physicists from CERN's Theory Division.

[849] When they completed their paper in 2008, Giddings and Mangano submitted it to CERN's ad hoc LSAG group but, in the meantime, did not disclose the paper to the public or to the broader scientific community. [Mangano, ein Cern-Physiker, und Giddings, ein Physiker mit beruflichen Beziehungen zum Cern, sind die Autoren einer Studie, die dem Bericht der LSAG zugrunde lag.]

[851] Giddings and Mangano concluded that there is "no risk of any significance whatsoever from such black holes" (…)
The LSAG Report, on the other hand, used words purporting to extinguish all risk that could be imagined, saying that black holes from the LHC "present no conceivable danger."
In May 2008, CERN's Scientific Policy Committee ("SPC") (…) drafted its own document assessing the matter. The SPC's document went further rhetorically than even LSAG was apparently willing to go. The SPC statement referred to LSAG's work as "proof" of the LHC's
safety. (…) [Laut SPC beweise die Existenz der Sonne, dass Schwarze Mini-Löcher ungefährlich seien.]
This, of course, is wrong. The Giddings and Mangano paper never purported to exclude risk based on the existence of bodies such as the Sun, doing so instead on the basis of white dwarfs and neutron stars.

[857f] John Ellis of CERN referred to LHC detractors as "nuts" (…) Another CERN physicist referred to LHC critics as "crazy people."355 Much more blunt was renowned University of Manchester physicist Brian Cox: "Anyone who thinks the LHC will destroy the world," he said, "is a twat [Arschloch]."

[858] In August 2008 (…), John Ellis gave a talk in the CERN auditorium in which he sought "to provide the ammunition" that CERN people could use to convince others that the
collider poses no danger. (…) Ellis explained that a question that worried him more than whether humanity was safe from the LHC, was the opposite—whether the LHC was safe from humanity. [Ellis sagte Anfang 2010 gegenüber Physics World, das Resultat der Sicherheitsstudien habe «zum Voraus festgestanden» («it was a foregone conclusion»).]

[871] Who is right? Who is wrong? Let us put ourselves in the position of the judge. Our first instinct is to make an independent evaluation of the matter. So, what result do we get when we check the calculations for ourselves?
Of course, that is precisely the problem. We can do no such thing. The subject is utterly recondite. The few people on Earth who are capable of intimately understanding the subject matter form a very exclusive club. Judges and lawyers are not members.

[873] (…) there is a problem with experts. (…) Every expert has a very personal stake in the matter. Generally speaking, the experts are either afraid for their livelihoods or for their lives.

[874] Of course, CERN's theories are, technically speaking, falsifiable—but only in the unhelpful event that the Earth is destroyed (…)

[876] General acceptance, or the lack thereof, from a community of particle physicists [ein wichtiges Argument für Wissenschaftsjournalisten!] means next-to-nothing when that community itself has a stake in the matter.

[883f] if the judiciary surrenders to these difficulties and refuses to involve itself in such disputes [Das wurde in Blogs oft gefordert: Die Juristen sollen schweigen, die verstehen ja doch nichts von Physik] (…) then the judiciary renders a class of consensus judgments within scientific communities effectively injudicable. In that event, the rule of law is lost.
Yet if the judiciary plows ahead and issues an injunction in such cases—deciding that we are better safe than sorry (…)—then courts would be transformed into marionettes—manipulable by frivolous objectors into halting any scientific undertaking that is complicated enough to be opaque to the layperson. That seems unacceptable as well.

[883] But let us pause for a moment for a reality check: Is it really plausible that a group of extremely smart, highly trained, non-sociopathic scientists and engineers could overlook fatal flaws in a wildly expensive, high-stakes project and thus cause a deadly catastrophe? Of course it is. It is not only plausible, but it has already happened multiple times. Examples include the space shuttle Columbia disaster, the space shuttle Challenger disaster, and the disastrous Castle Bravo thermonuclear bomb test.

[883f] What these and other examples teach us is that there are ways that courts can evaluate seemingly recondite technologies and scientific controversies. The trick is to focus on the comprehensible factors—namely, the human factors. [Und das selbe gilt für Wissenschaftsjournalisten!] (…) While courts may not be well equipped to settle scientific disputes on the scientific merits, courts are quite well equipped to look at the human aspects.

[888] Indeed, Don Lincoln, particle physicist and steadfast LHC defender, is candid about science's limitations. "We simply don't know how gravity works in the realm of the ultrasmall," he wrote. In forecasting what might result from the LHC's experiments, Lincoln wrote, "Of course, there can always be surprises. This is the research frontier, after all." Yet, when the specific question of LHC safety arises, Lincoln has resolute confidence, saying the LHC poses "precisely zero risk" and that a planetary disaster is "impossible."

[894] The Giddings and Mangano paper makes many assumptions. While presumably reasonable on their face, many of these assumptions are untested.

[895] It seems to be the case that few people have the combination of training and incentive needed to undertake the detailed work of putting the Giddings and Mangano piece through its paces. If so, this cuts strongly against using the Giddings and Mangano paper as the sole poses no risk whatsoever.

[901] Psychologist Irving L. Janis worked up his theory of groupthink when trying to resolve a paradox of his own. Reading a history on the 1961 Bay of Pigs fiasco, when U.S. operatives staged a spectacularly failed invasion of Cuba, Janis found himself asking, “How could bright, shrewd men like John F. Kennedy and his advisers be taken in by the CIA’s stupid, patchwork plan?”
His answer was “groupthink.” The groupthink concept acknowledges that “smart people working collectively can be dumber than the sum of their brains.” According to Janis, groupthink is “a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members’ strivings for unanimity override their motivation to realistically appraise alternative courses of action.” It involves “a deterioration of mental efficiency, reality testing, and moral judgment that results from in-group pressures.” (…)
The classical antecedents for groupthink are group cohesiveness, leadership’s existing preference for a certain decision, and insulation of the group from outside opinions. Considering these factors, CERN would appear highly vulnerable to groupthink.

[904] If a pharmaceutical firm attempted to take a drug to market based on the safety assessment of a panel of five of its employees, who in turn relied on the scientific work of one employee and one other scientist with a pending visiting poproportions.

[906] What level of risk is significant to particle physicist with an interest in the experiments, and what level of risk is significant to an uninterested party, will undoubtedly be different.

[908] Someday, we may need to seriously consider catastrophic threats from nanotechnology, genetic engineering, or artificial intelligence. Each one of these human-made global disaster scenarios involves incredibly complex questions of science, engineering, and mathematics. Courts [und das gilt auch für die Medien, meine ich] must develop tools to deal meaningfully with such complexity. Otherwise, the wildly expanding sphere of human knowledge will overwhelm the institution of the courts and undo the rule of law—just when we need it most.