Illustration by Christiana Couceiro

FEATURE

The Rebel Physicist Trying to Fix Quantum Mechanics

For a century, quantum theory has been scientific orthodoxy. The Italian physicist Angelo Bassi is certain it isn't the full story — and that he can prove it.

By Bob Henderson

June 25, 2020, 5:00 a.m. ET

‘The thing that amazes me is that quantum mechanics is only 100 years old,” the physicist Angelo Bassi said. We were in conversation across a picnic table on a drab Soviet-era campus in Zagreb, an early-autumn breeze swishing through the yellowing leaves of some nearby trees. “It’s a baby, it’s nothing — 100 years in the history of science. How can you just stop there? It doesn’t make sense any way you look at it.” We sat in the shadow of a rust-stained beige building where Bassi was about to speak at a workshop for physicists who specialize in the century-old subject.

Despite the theory’s advancing years, even college-educated adults tend to have only a hazy sense of what quantum mechanics says. And for good reason. Although physicists use it to predict the behavior of the fundamental particles, like electrons, that make up atoms and the photons that make up light, and in spite of its having been the basis of many of the 20th century’s signature technologies (including nuclear power, lasers and computers), the theory has confounded even the cognoscenti from its beginnings in the 1920s. That’s because, while it’s spectacular at making predictions, it doesn’t describe what’s actually happening underneath nature’s hood to make those results come about. It would be one thing to concede that science may never be able to explain, say, the subjective experiences of the human mind. But the standard take on quantum mechanics suggests something far more surprising: that a complete understanding of even the objective, physical world is beyond science’s reach, since it’s impossible to translate into words how the theory’s math relates to the world we live in.

Bassi, a 47-year-old theoretical physicist at the University of Trieste, in northeastern Italy, is prominent among a tiny minority of rebels in the discipline who reject this conclusion. "I strongly believe that physics *is* words, in a sense," he said across the picnic table. And whereas all the other talks at the workshop focused on the empirical implications of quantum mechanics, Bassi's would make a case for what a vast majority of his colleagues consider a highly implausible idea: that the theory upon which nearly all of modern physics rests must have something wrong with it — precisely because it can't be put into words.

Of course, much about quantum mechanics *can* be said with words. Like the fact that a particle's future whereabouts can't be specified by the theory, only predicted with probabilities. And that those probabilities derive from each particle's "wave function," a set of numbers that varies over time, as per an equation devised by Erwin Schrödinger in 1925. But because the wave function's numbers have no obvious meaning, the theory only predicts what scientists may see at the instant of observation — when all the wave function's latent possibilities appear to collapse to one definitive outcome — and provides no narrative at all for what particles actually do before or after that, or even how much the word "particle" is apropos to the unobserved world. The theory, in fact, suggests that particles, while they're not being observed, behave more like waves — a fact called "wave-particle duality" that's related to how all those latent possibilities seem to indicate that an unobserved particle can exist in several places at once. The act of observation itself is then posited to somehow convert this nonsensical situation into the world we see, of objects having definite locations and other properties. This makes human beings, who are after all the ones making the observations, in essence responsible for conjuring the reality we experience out of a murky netherworld that quantum mechanics implies is simply unknowable.

Arguments about quantum theory have a tendency to turn into untestable philosophical speculation. But what makes Bassi exceptional, even among the rebels, is his conviction that experiments will soon show that quantum mechanics is in fact only approximately correct, the mere tip of a deeper and more fundamental theory that will describe the objects and mechanisms that make fundamental particles act the way they do, without any reference to the role of human observation. And what makes him even more exceptional is his success in getting such studies off the ground. Bassi's research is focused on a possible alternative to quantum mechanics, a class of theories called "objective collapse models" that doesn't rely on human observation to collapse a wave function's possibilities to a single outcome, but that invokes instead an objective, physical process to do the job whether anyone's looking or not. And Bassi is now leading the most ambitious experiment to date that could show that objective collapse actually happens.

If he is proved right, the implications for physics, technology and, yes, even philosophy, would be immense. Such an outcome would speak to questions of what we can hope to understand about the world, and conversely, which questions are destined to remain forever off-limits.

A few days before Bassi's talk in Zagreb, I attended the first class of his quantum mechanics course on the University of

Trieste campus, which crowns a high hill overlooking the crescent-shaped city and the Adriatic Sea. Bassi wore a long-sleeved black T-shirt and skinny jeans that, with his lanky frame and large hands, gave him, as he paced and gestured at the front of the room, the aspect of an ungainly mime.

He was speaking Italian. I don't speak Italian, but when he chalked "F = ma" onto the blackboard, I could see he was reviewing Newton's laws of motion, also known as classical mechanics. Classical mechanics does a fine job explaining the movements of things much larger than atoms, like bacteria, baseballs and planets. And even though making such predictions requires math, understanding the theory's meaning doesn't. Bassi drew a dot on the board, and then a curvy line with an arrow at its end: a particle moved by a force through space. Add to that picture the premise that baseballs and the rest are just collections of such particles and you can say in four words, as Bassi repeatedly did to me, how classical mechanics says the world works: "particles subject to forces."

Bassi then wrote Schrödinger's equation on the board — quantum theory's upgrade to "F = ma," a moderately more complicated combination of letters and numbers that still applies to baseballs and the rest, but also to molecules and atoms. Schrödinger himself, as disconcerted as anyone by quantum theory's lack of description, figured that it was simply incomplete — a conclusion his contemporary Albert Einstein shared, pointedly asking one colleague if he truly believed that the moon wasn't there when no one was looking. But to most of the other founders of quantum mechanics, in particular the highly influential Niels Bohr, the theory's limitations simply signaled that physics had reached a dead end, that it could go no further in revealing the true nature of nature, and that it would have to content itself instead with its bread and butter of making predictions. “Shut up and calculate,” a theorist once quipped to sum up this stance, which has become, more or less, physics orthodoxy today and the way the subject is taught in most textbooks and universities.

Still, a veritable zoo of conjectures for what quantum mechanics might really imply about the world has been floated by physicists and philosophers over the years, including some that postulate parallel universes and others a special status for the human mind. And the theory’s completeness is still questioned by a handful of skeptics, including the Nobel laureate Steven Weinberg, whose own textbook on the subject expresses his hope that a better theory will emerge and reveal the story quantum mechanics refuses to tell.

Schrödinger coined a term — “entanglement” — for the way quantum mechanics itself may account for its reluctance: the wave functions of any two interacting objects, including observer and observed, get wove into one. This puts a researcher probing the subatomic world into a position similar to that of one water droplet trying to deduce the dimensions of another by touching it: Since the end result is one big droplet, the observing droplet can work out the volume of the observed (by subtracting its own initial volume from that of the big droplet) but can’t glean its original shape. Entanglement could be responsible for keeping objective reality behind a veil.

Nonetheless, Schrödinger also came up with his famous cat paradox to argue that quantum mechanics can’t be the whole story.

He imagined a cat locked in a box with a vial of poison and a radioactive substance that, his equation predicts, has a 50 percent chance of emitting a particle that breaks the vial and kills the cat in the time before a researcher is scheduled to look inside. Now, before that observation, quantum mechanics represents the particle with a wave function that encapsulates its two potential destinies (emitted or not) and that suggests that the particle has realized neither. At the same time, entanglement interweaves that wave function with those of the vial and cat, uniting their fates. This leads to a patently absurd description of the situation in the box before it's opened: The particle is neither emitted nor not; the vial is neither broken nor not; and the cat is neither dead nor alive. Clearly, concluded Schrödinger, something is missing in this picture.

But what's missing, says the orthodoxy, is an understanding of what physics is really about. "Physics," Bohr wrote, "is to be regarded not so much as the study of something a priori given, but as the development of methods for ordering and surveying human experience."

If all we ask of physics is that it describe human experience, then the paradox goes away. Quantum mechanics predicts, correctly, that the researcher, upon opening the box, is as likely to find the happy outcome as the alternative. And that's it. To ask the cat's condition before that is, from the orthodoxy's perspective, as inappropriate as asking which way is north from the North Pole.

Of all the weird things about quantum mechanics, this limitation on the knowable is the weirdest, and the most profound. It suggests that scientists' most accurate model of the world can't describe whatever goings-on underlie our observations — or even be specific about what "observations" actually are, and what their effects are. Do they affect the cat? Or do they only happen in the observer's mind? And although most physicists today have given up hope of answering such questions, Schrödinger, like Einstein, never did. He called its lack of description a "much overrated provisional aspect" of the theory he helped invent, one that resulted, he believed, from an all-too-human desire of his fellow physicists to believe they had found in quantum mechanics a lasting truth.

Weinberg, who wrote a book titled "Dreams of a Final Theory," mused by phone with me about the possibility that quantum mechanics really is the truth, such that the ultimate theory that physicists dream of would only address human experience and say nothing about nature beyond that. "That would, to me, be horrible," he said. "In fact, I might almost conclude that if that's what it is, the hell with it."

Still, largely because quantum mechanics has passed so many extraordinarily precise tests, collapse models are generally dismissed when considered at all, and few physicists think Bassi will succeed. Even Weinberg, on the phone, characterized his quest as "interesting" but "to some extent whistling in the dark."

The day after his lecture in Trieste, Bassi was driving me in his blue, weather-beaten Peugeot to his hometown, Colloredo di Prato. As the saw-toothed Alps sliced by in the sky out the passenger window, I asked what things were like when he was growing up.

“There was this moral aspect of working,” he said, “which now in a sense is lost.” Young people now, he said, are too concerned with “success” and “being known.”

“Success is nothing,” his father taught him. “Proper work is what counts.”

Although Colloredo di Prato and Trieste are just an hour’s drive apart, they are, he told me, “really two different worlds.” Trieste, created ad hoc as a port, is a city of merchants, of buying and selling. His home region, farther inland and with a longer history, is instead a place of artisans and farmers, of making and growing. And you could just as well say “really two different times” about Bassi’s early childhood, which was practically preindustrial. His first home was a two-story brick-and-fieldstone apartment block — the same his father grew up in — where a handful of families lived and shared a courtyard for their horses, pigs and cows. A stone outhouse still stands there today, and although indoor plumbing had come by the time Bassi was born, television hadn’t. His first memories include running old-fashioned errands with his mother, to the local grain mill and cheesemaker. One of his first friends was a chicken. Bassi’s older sister, Ivana, fondly recalls the way little Angelo would sit in the middle of their country street and “pamper his beloved hen.”

His father was a blacksmith, his mother a nurse. His father died four years ago, but Bassi calls his mother every day, and they speak, as they always have, in Friulan, the once-dominant language of the area that is now fast being displaced by Italian.

Standing in his childhood courtyard, surrounded by the plaster-patched stone walls of empty haylofts and abandoned apartments, it is tempting to draw a line between Bassi's Old World upbringing and his unfashionable views on physics. Not to mention the church, not a hundred yards away, whose bell tower still looms over the whole charming but decaying scene. Bassi is a practicing Catholic and a believer in God, something he says is "unusual" but "not rare" among his colleagues at the university. Einstein called his own belief that reality could be understood "religion," and I wondered if there's a connection between Bassi's religious faith and that in what has become essentially a far-right position in physics. I asked him at the picnic table in Zagreb.

He thought for a moment.

"Yes, it is like that," he said. "The idea that there is truth and simplicity behind phenomena, if you wish, you can relate it directly to a faith in God that is a unity that gives rise to everything."

He paused again.

"But it is also an intimate feeling," he added. "It is not necessary that I want to link the two things."

This feeling, he told me, is backed up by his experience.

"The simple things in life are the more genuine ones," he explained. "When a person is simple, he's a better person."

The idea that the universe is simpler than it appears is supported by the way advances in physics, from Newton's to Einstein's and beyond, have accounted for more and more phenomena with fewer and fewer equations. But as the Cornell University physicist N. David Mermin — an arch advocate for the orthodoxy and likely the wit behind the phrase “shut up and calculate,” who has avowed that the moon is demonstrably *not* there when no one is looking — argues, taking an assist from the 18th-century philosopher David Hume, historical precedents and inductive reasoning can’t prove anything, not least what reality is really like. I appreciate this argument’s humility, and said so to Bassi across the table.

There is actually “arrogance,” he countered, in the orthodoxy’s assumption that quantum mechanics is correct.

“That attitude blocks research, at the end of the day,” he said. “Even if the world is ultimately not understandable, there is no reason to believe we have hit the bottom with quantum mechanics.”

Bassi told me he started in physics with far more interest in the enlightenment that theories provide than in their utility. Many starry-eyed students start off the same way, but quantum mechanics has a way of dumping water on their dreams. (As someone who finished his physics Ph.D. only to switch to a career in finance once both enlightenment and employment seemed out of reach, I write here from experience.)

“When you are a student, of course, you believe the teacher,” says Detleff Dürr, a mathematical physicist at the Ludwig Maximilian University of Munich and a mentor to Bassi. “You think to yourself, OK, there is something in nature, something which is really beyond our understanding.”

Nonetheless, an incoming student with an inclination to question the orthodoxy could not have picked a much better place and time than the University of Trieste in the 1990s. Giancarlo Ghirardi, who taught Bassi's first class in quantum mechanics and later became his Ph.D. adviser, and who died in 2018, is remembered at the university as a dedicated and talented teacher. But outside Trieste, Ghirardi is best known for being one of the architects of objective collapse models, which have the potential to settle the debate over what quantum mechanics means.

Broadly, there are two takes on that question. One is the orthodoxy, also called antirealism (although generally only by the nonorthodox; physicists tend to recoil at being labeled anything other than some version of realist. Mermin, for example, prefers the term "participatory realist"). The antirealists are the intellectual heirs of Bohr who believe that physics can only describe the human experience of reality, and that quantum theory's paradoxes result from misguided attempts to use it to discern the nature of reality itself.

Then there are the realists (as they happily call themselves), who are, loosely, the scions of Schrödinger and Einstein, and who believe that physics can and should describe the world as it exists apart from us — by explaining, for example, what's going on with that cat in the box. Two ways of reconciling quantum theory with realism have gained traction. One, popularly known as "many worlds," argues that all the possibilities encoded in wave functions actually happen, so that Schrödinger's cat both lives and dies (and, more generally, that everything that can happen does), albeit in different branches of a vast and ever-growing multitude of universes. The other, called Bohmian mechanics, salvages Newton's "particles subject to forces" picture, and assigns the cat a single fate, but only by giving particles seemingly supernatural powers, such as the ability to influence one another's movements across cosmic distances instantaneously and to effectively conceal many of those movements from experiments.

Both of these options are strange and both have the embarrassment of forever-invisible features — such are the contortions physicists must make when imagining realities consistent with quantum theory's bizarre predictions — but both also illustrate possible ways that quantum mechanics might actually describe as well as predict. The real problem is that these alternative realities are at odds with each other and with those of other competing interpretations. And that, since mere interpretations of quantum theory make no new predictions, experiments can't choose between them, so that which a person favors is pretty much a matter of taste.

"I always considered it rather an empty game," says Stephen Adler, a physicist at the Institute for Advanced Study in Princeton, and another Bassi mentor and collaborator. "Physics is an experimental subject. If they can't be distinguished experimentally, I don't care what your interpretation is.”

Ghirardi and his colleagues arrived at objective collapse models by performing a delicate conceptual transplant that excised quantum theory’s references to observation and replaced them with a new mathematical term added to Schrödinger’s equation. By inducing objective collapse, the new term transformed the theory from one that describes what observers *see* into one that describes the world as it *is* (assuming, of course, that the theory is right). The hard part was finding a way to do this that didn’t cause the new theory to contradict any of quantum mechanics’ many unerring predictions. The trick, it turned out, was to endow fundamental particles with some funky new properties.

“You should remove the word ‘particle’ from your vocabulary,” Bassi explains. “It’s all about gelatin. An electron can be here *and* there and that’s it.”

In this theory, particles are replaced by a sort of hybrid between particles and waves: gelatinous blobs that can spread out in space, split and recombine. And, crucially, the blobs have a kind of built-in bashfulness that explains wave-particle duality in a way that is independent of human observation: When one blob encounters a crowd of others, it reacts by quickly shrinking to a point.

“It’s like an octopus that when you touch them: *Whoop!*” Bassi says, collapsing his fingertips to a tight bunch to evoke tentacles doing the same.

If objective collapse were to be confirmed, the orthodoxy’s belief that the laws of physics must inevitably reference us in them will lose its main motivation. The way the world works will once again be expressible in words. “Jelly that reacts like an octopus” will be the new “particles subject to forces.” New, exotic phenomena will be identified that could spawn currently inconceivable technologies. Schrödinger’s cat will live or die regardless of who looks or who doesn’t. Even the unpredictability of the subatomic world could turn out to be illusory, a false impression given by our ignorance of octopoid innards. The only problem, in the 1980s when collapse models were conceived, was that the deviations they predict from quantum theory are so tiny that no feasible experiment could have hoped to detect them.

But technology had come a long way by 2004, when Adler asked Bassi to collaborate with him on calculating observable consequences of collapse. Since then, Bassi has built a career out of dreaming up ways to discern evidence of an octopus-based reality. As a theorist, Bassi doesn’t do the experiments himself, but pushes progress in other ways, such as inspiring experimentalists like Catalina Curceanu, a lead researcher at Italy’s National Institute of Nuclear Physics, into action.

“I got really, really fascinated by the heresy that somebody wanted to change the Schrödinger equation,” Curceanu told me.

Her institution runs a lab beneath Italy’s Gran Sasso mountain, and her experiment repurposed dark-matter detectors to look for the X-ray radiation Bassi’s team computed should be emitted by oodles of tiny octopi going: *Whoop! Whoop! Whoop!*

In other cases, Bassi's team has scavenged data from experiments having nothing to do with collapse, conducted by people having no clue as to how their results would be repurposed. Thus far, none of the telltale vibrations that collapse models predict, or effects such as radiation that should result from them, have turned up. Yet, each new analysis has provided useful information by putting bounds on how loud the *Whoops!* might be, as well as at what frequency or pitch.

The game of listening ever more carefully for a noise and setting ever lower limits on its volume sounds just as potentially endless as the original stalemate over what quantum mechanics means. And it would be, but for one key fact: For objective collapse models to be consistent with the fact that macroscopic objects have definite positions and other properties (including cats always being either dead or alive), the noise must be louder than a particular level, a kind of minimum murmur. The gap between this minimum and the maximum set by vibration-detection experiments is a measure of how much of the listening game there is left to play. Bassi keeps track of it with a sort of two-dimensional, multicolored scorecard called an "exclusion plot" — volume on one axis, frequency on the other — wherein noise levels ruled out by experiments are shaded and the remaining white space indicates the region yet to be explored. Bassi calls this area a "grand desert," and puts the plot in many of his papers, each time with a little less desert left.

The desert remains grand: about 10 orders of magnitude wide, which, in terms of distance, implies a range between the breadth of a grain of sand and that of the United States. Scouring it all could take decades, or longer. But another way that Bassi is working to accelerate the game is by getting the first experiments actually custom-built to detect objective collapse off the ground, including one called TEQ (TEsting the large-scale limit of Quantum mechanics).

“TEQ,” explains Hendrik Ulbricht of the University of Southampton, England, “is a European project that was funded with quite a lot of money, actually, to just test collapse models, to do nothing other than look for this noise.”

Bassi orchestrated the fund-raising effort that led to a 4.4-million-euro grant from the European Commission for TEQ, and Ulbricht is the experimentalist who’s building the apparatus and who will run the testing in his lab starting in late 2021. The idea is to scan a new swath of desert by levitating a hundred-nanometer-size glass bead with a swirling web of electric fields inside a high-tech refrigerator and monitoring the bead’s motion with lasers. The whole steel-and-glass contraption, when finished, will stand about four feet high and, if it works as planned, will either detect history-making *Whoops!* as vibrations of the bead in excess of what quantum mechanics predicts, or otherwise lop two more orders of magnitude off the desert, shrinking its size from that of the United States to that of New York City, as measured from the top of the Bronx to the bottom of Staten Island.

Bassi is the project’s principal investigator, essentially its C.E.O., an unusual role for a theorist but one that works “really nicely,” Ulbricht said, because Bassi’s punctiliousness enforces a discipline on the eight other research groups in addition to Ulbricht’s that are collaborating on the project and which are scattered all over Europe.

“Have you seen his laptop?” Ulbricht asked me when I visited his lab, his brows raised with wonder at Bassi’s apparently awe-inspiring filing system. But what Ulbricht finds particularly distinctive about Bassi’s approach are his different ways of dealing with physics and people.

“When we talk about physics, he turns into an investigator and he really asks questions where you sometimes feel it’s unpleasant,” he told me. “He’s investigating and he really wants to know: ‘Is it this or that?’”

“At the same time,” Ulbricht said, “he’s very gentle and he knows where to stop. He could, I guess, just easily prove me wrong and say what I’m saying doesn’t make sense. But when he feels that he’s reached a point where I cannot be pushed any more, then he stops to talk about the weather or something.”

Bassi’s friends cite a similar, almost wave-particle-like duality.

“If he has a clear idea of the way he likes it,” says one, “it has to be *exactly* the way he likes it. There’s no compromises.”

That applies to most things, from physics to food. “Even though he’s Italian, he hates lasagna,” says another friend, “because it mixes all the ingredients. For Angelo, it must be a steak here, potato there and maybe a little topping over there. He’s very precise.” But when it comes to people, both friends agree, Bassi is much softer, very polite and “very socially aware” — the kind of person who makes sure that no one at a dinner party is left out of the conversation and who is chatty and playful as a rule. His version of small talk is a steady stream of droll complaints about things that aren’t exactly the way he likes them and good-natured digs aimed at others' idiosyncrasies, like when I told him my typical breakfast is a bunch of ingredients blended into a smoothie.

"We are no longer friends," he said with a serious stare.

When I visited him, it was just after his honeymoon. He had married a lawyer from Trieste named Chiara.

"How much does this guy talk?" Chiara told me was her first reaction to Bassi's nonstop commentary. She, like every other acquaintance of Bassi's I spoke with, describes her new husband as an open book. And, after a week spent probing him with all manner of questions, observer to his observed, I can't disagree. Bassi gives every appearance of being, or at least trying to be, as transparent as he believes physics should be.

Schrödinger — who, by the way, speculated that subatomic particles might actually be "structureless jelly" — equated the birth of science to the emergence among ancient Greek philosophers of the idea "that the world around them was something *that could be understood*, if one only took the trouble to observe it properly."

That's how Bassi sees TEQ. He once told me that he's "100 percent sure" that TEQ or some future experiment will find quantum mechanics wanting, an opinion that he fully admits is based on his philosophy rather than facts. Ulbricht, for his part, is agnostic about what TEQ will find, but he takes issue with a common criticism that it's motivated *only* by philosophy, since collapse models are widely perceived as Rube Goldberg-esque contrivances designed to satisfy a craving for comprehensibility in a world made unfathomable by quantum mechanics.

“We have to actually bring it back from philosophy,” he said. “There is a clear prediction of what quantum mechanics says and there’s a clear prediction of what collapse models say. What these experiments can deliver is that they can decide.”

Ulbricht’s pragmatism is in fact more representative of the TEQ team’s generally than any sort of overthrow-the-orthodoxy evangelism. Mauro Paternostro, a theorist at Queen’s University Belfast who helped Bassi and Ulbricht get TEQ off the ground, is as convinced that quantum mechanics is correct as Bassi is that it isn’t. And the collaboration even includes card-carrying members of the orthodoxy, including Caslav Brukner, a physicist at the Institute for Quantum Optics and Quantum Information who dismissed the realist’s dreams by telling me, “That story is already over.” Still, he wrote later by email, “we need to extend the parameter regime over which our existing theories are tested.” In other words, someone needs to double-check the desert before turning out the lights on realism for good.

Ironically, Bassi’s fingers could be on the switch if experiments rule collapse models out. On the other hand, he confessed to me, had he studied under a Bohmian like Dürr instead of Ghirardi, he, too, would likely have become a believer in Bohmian mechanics. In that alternative universe, he would not expect experiments to detect deviations from quantum mechanics, and he’d likely accept that theory’s quirks as simply reflecting a peculiar underlying reality that can’t be directly observed. Which makes Bassi’s beliefs at least partly a matter of chance — and maybe, as they are for many people in many fields, partly an adaptation to his work. I asked him at the picnic table how important he thought his beliefs are to doing his job.

“The working conditions, in some sense, are really miserable,” he replied. “You are not famous, you don’t get money, you have to fight every single day, you have to do a lot of administration and horrible things. So you have to believe, in the sense that you have the passion for all that.”

I remembered an old Einstein passage about people pursuing science in order to “escape from everyday life with its painful crudity and hopeless dreariness,” as well as Mermin explaining to me by email how the more favorable view of people he developed as he aged made it easier for him to accept that it’s humanity all the way down, even in physical science. I summarized all this for Bassi, still hoping at the end of a weeklong investigation to get to the bottom of his impulse to separate human nature from the physical kind, like two different foods on a plate. He had, after all, repeatedly lamented in our time together the way people’s hunger for power perpetuates the orthodoxy, as experts prop up their authority by keeping everyone else in the dark. So maybe, I ventured, he’s seeking something less sullied in physics?

Bassi was bewildered by the question. That people are deeply flawed is a fact, he reaffirmed. But that reality and other painful aspects of life are, he continued, inseparable from life itself. Understanding, not escape, he said, is his motivation. In fact, for him it’s the other way around: Everyday life, with family and friends, is his refuge from work. He reminds himself of this, and of his belief that people and relationships are more important than science and accomplishments, by murmuring a mantra to himself several times a day: "It's only physics. It's only physics. It's only physics."

Inside the rust-stained beige building in Zagreb, Bassi stood at the front of a dimly lit amphitheater with 15 or 20 workshop attendees scattered among the seats.

His lecture was simple, by science-conference standards; it presumed no familiarity with collapse models, or even with basics like Schrödinger's cat — a strategy, he explained to me later, designed to encourage people to think anew about old problems. His PowerPoint included a spooky cartoon of a dead and alive cat, the requisite reams of equations and, of course, his magnum opus: the exclusion plot with its grand desert.

At the end, nearly everyone had a question or comment. A lively discussion ensued until one German physicist stood and asked a question that Bassi gets regularly and that he finds irritating: "What is your Plan B?" — you know, if collapse models are ruled out.

The question annoys him for its implication that ruling out a bona fide possibility would not be a valid contribution to science. But also for its emphasis on success and its insinuation that Bassi and his physics are somehow synonymous, such that if collapse models fail, he, too, will have failed. After all, people should appreciate that proper work is what counts, simply doing a job well that needs doing.

But sometimes with people it's better to avoid words. Bassi just smiled at his inquisitor and pointed to his wedding ring. The room erupted with laughter.