

Lecture 2

Introduction

We will continue now with a famous saying of the Ba'al Shem Tov: No matter what the opinion any of the great Rabbis (and in his time there were very great sages) I can contradict it. This is truly a remarkable statement that the Ba'al Shem Tov was saying. What was the BA'AL SHEM TOV trying to say by this? Clearly, he was not trying to make himself out to be the smartest of all the sages. What does it mean that he can find a loophole in any *svara* (any line of reasoning)?

The Ba'al Shem Tov himself explained his meaning. What he meant is that every theory that is proposed by any Torah authority is a thought experiment in the realm of a particular world. But in the middle-most point of that reality there is an essential nothingness. I [the BA'AL SHEM TOV]—there is only one great soul that is the Moses of the generation and is in tune with that zero-point³ that is in the middle of every theory—am in tune with that zero-point. What is the purpose of this middle zero-point? The zero-point is connected to the zero-point within each world, each level of consciousness. Together, all the zero-points through all the worlds are like a tube, or pillar, through which the person who is in tune with them can ascend and descend through all the worlds. Now this is a very deep and important realization for science in general.

Every scientist, as great as he might be, like Einstein, to the extent that he is really honest, must ask a question whether science can ever really reach the end [of understanding]. Can it come across and present a theory or equation that will completely encompass and represent all of creation. There are many audacious scientists that think that we are on the verge of achieving exactly such a description that will indeed explain everything. We will know everything with one formula. Then all the scientist will have to retire, because then we know everything about the world. In one formula we will know the entire story of creation.

It's truly an amazing thing that scientists, who are usually very smart people, do not learn from experience. The sages say that a wise person is one who learns from experience. The

³ In modern string theory there is an equivalent concept called a zero-brane.

experience of the last few hundred years has shown time and again that one theory has always been consumed by the next. There has always been a little "loophole" in the first theory that could not be explained, which led to the creation of a new, more encompassing theory, which then consumed the previous theory. And then scientists think: "Now we have it made." But, again there is always one little loophole left that cannot be explained.

And yet, every time that the new theory is developed, scientists think again that they are on the verge of understanding it all, if only that one little thing that we can't explain would just go away. In fact, that one little thing is exactly what causes the downfall of that theory. And then some new theory comes about. So how dumb is it on the part of some scientists to think that we are on the verge of explaining everything and leaving no room for doubt and no loopholes. This is what the Ba'al Shem Tov was saying. Whatever theory that you present, because I am connected with the nothingness, I can find the loophole in it. And this is actually a good thing, because by finding the loophole, the unexplainable nothingness that lies at the core of every theory, the Ba'al Shem Tov forces you to uncover a higher theory.

We have to say that it is by Divine Providence that scientists are dumb in this respect, because, were they not, they might just give up on studying science. They might become musicians or something else, which might be a good thing. But because they have this initiative and vigor and momentum that we are on the verge of knowing it all, this keeps them on their toes.

The Ba'al Shem Tov did not mean his statement to cause Rabbis to stop studying Torah and presenting their understanding of the Talmud; on the contrary. He just told them that whatever deep understanding they will arrive at he will find the loophole. Now that loophole in your understanding is called a "*stirah*," which means a "contradiction." But, the root of this word in Hebrew is the same as that for the word that means "concealed" (*hanistarot*, as in the verse "The concealed is for Havayah our God"⁴).

There is another thing here. Rav Chaim Vital asked the Arizal why it is that things that were supposed to be concealed, even from the greatest Kabbalists, were revealed by him, the Arizal. The Arizal answered that no matter how much you reveal there will always be *nistarot*, there will always be something more that remains concealed. It will simply be at a higher level.

Every revealed level has a loophole. Applying this to my own personal life, this means that regardless of how I live, there is always a loophole in my lifestyle. There is always a concealed

⁴ Deuteronomy

element, a concealed contradiction and loophole that is the opening for an ascent to a higher level. And like with the Ba'al Shem Tov, if I connect myself to the person who can show me this loophole, I can ascend through it to a higher level of consciousness.

In Hebrew, the word for contradiction, *stirah*, also means "to tear down," meaning, that this little loophole will ultimately be the destruction of the previous theory and allow us to ascend to a higher level of understanding. And that new theory will also have its own *nistarot*, its own concealed aspect.

Now we will fill in a few things that relate to what we said in the previous class. GR is based on the equivalence principle, which says that the experience. Both general and special relativity are based on subjective experiential concepts. The uncertainty principle of QM was at first thought to be a subjective experience or subjective limit, but it was then realized that it is a purely objective experience. What this led to is to a completely counter-intuitive conclusion, which contradicts all of our subjective experience, i.e., that "an electron is not a thing." I do not know what it is. It is the **חומר היולי** (the formless matter), which is the substance of the world of Bri'ah (creation). It is also called a golem, as we will explain later.

Let us turn now to the world of Atzilut (emanation) as it is revealed in the World of Yetzirah (formation) in General Relativity. What is the verse that best alludes to the essence of General Relativity? In the very beginning of the Song of Songs (1:4) we find the words: "Attract me, and we will run after you..." This is a beautiful encapsulation of the equivalence principle.

Gravity in Hebrew is called *meshicah* (**משיכה**), which means to draw, or to attract. As we will go on to explain, gravity is the only one of the forces of nature that is purely attractive. Its "charge" is mass and it is all positive. So even though it is very weak relative to the other three forces in nature, it has the greatest effect on the universe. So this verse begins "draw me to you, make me gravitate to you" and then "we will run after you." What does this second half of the phrase mean? "We will run after you" means acceleration. This is a beautiful statement of Einstein's discovery of the equivalence of gravity and acceleration.

There is a slightly irregular grammatical feature in this phrase. The first half is in the singular ("Attract me,") while the second half is in the plural ("And we will run after you..."). In Chassidic writings, it is explained that the force of gravity

affects the Divine soul [alone], while the acceleration is felt by both the Divine and animal souls together.⁵ This is something additional to what Einstein knew. There is definitely an equivalence in experience between gravity and acceleration. But the experience of acceleration is shared by my Divine and my animal soul. While, the initial gravitation is an arousal that God arouses my Divine soul. Once more, the gravitation of God towards the Jewish soul is the gravitation of Divinity to Divinity, that my soul is a part of Divinity, so the part gravitates to the whole, and the whole draws the part towards it. This is based on the Ba'al Shem Tov's famous saying that when it comes to the essence, when you hold on to a part of it, you are actually holding on to all of it.⁶ That is what spontaneous gravity is like. But when we say "We will run after you," meaning that the result of this is that both the Divine and animal souls experience acceleration towards the Divine. The reason for this is that acceleration is felt as something that "I am doing," which in order to be felt in this way requires that the animal soul, my feeling of self, should be involved also. In any case, we find from this verse that indeed there is equivalence between the experience of gravity and the experience of acceleration. This is another example of our methodology of searching for models that can illustrate scientific ideas in a verse, or in a gematria, etc. It is most important to find an *asmachta*, an allusion in the Torah for some concept in science or some other idea.

Now let us go back to the special theory of Relativity. The famous equation here is $E = mc^2$. We will need to investigate this equation in much more depth later. What this equation does is it equates mass or matter (m) with energy (E). We have here matter, which in Hebrew is called *chomer* (חומר). Energy is called *ko'ach* (כח). So Einstein's famous equation means that matter is just another form of energy. But, every little drop of matter has a tremendous amount of energy in it, since it is multiplied by the speed of light, which is a very big number.

Because of this equation, for some mysterious reason, space and time now become affected by events and by motion that takes

⁵ Einstein did not know about this distinction.

⁶⁶. העצם, כשאתה אוחז במקצתו אתה אוחז בכולו. Though here, and elsewhere, we translate the Hebrew word *etzem* (עצם) as "essence," there is no exact English translation. What *etzem* refers to is more accurately the "essential being," which always remains unchanged as it underlies all appearances and revealed characteristics. In a philosophical sense, *etzem* might best be equated with the Greek *hypokeimenon*.

place in them [the essential discover of Special Relativity]. So now we have actually four different concepts: energy and matter; and time and space.

In Kabbalah,⁷ these four concepts: time, space, force, and matter correspond to the four letters of God's essential Name,⁸ as follows:

Time corresponds to the letter *yud*, or wisdom. For instance, it is said: "Who is wise? One who sees the future."⁹ The intuition of time has to do with wisdom.

Space is a *binah* (understanding) concept as the verse says explicitly, "Where is the place of understanding?"¹⁰ This verse equates between space and *binah* (understanding); meaning that the experience of space is a mother experience, while the experience of time is a more fatherly experience. How can we explain this in simple terms: The womanly sense is to know where everything belongs in the home, each thing has its proper place. This is a sense of intuition regarding space. There are all kinds of modern psychological systems, especially geared towards women that build on this intuition. In Israel today there is a method that we do not subscribe to so much, which is known as the *megerot* system (the drawer system), which helps people (especially women) find the right way to file things in their mind. Once again, we do not hold from this system so much. Nonetheless, this system is building on the womanly intuition that everything has its proper place. To have the child grow based on a consciousness that is based on Torah study, that is the responsibility of the father. This includes planning the future, the career of the child. This is a more time oriented consciousness. The two together, wisdom and understanding, which here correspond to time and space, are called in Kabbalah: "Two partners that never sever from one another."¹¹

So what Einstein did is he connected time and space into one unit, one entity, that together they are one thing. In the terminology of Kabbalah, this is called the higher unification

⁷. For more on this see the Hebrew series of lectures on the topic of "Time and Space in the Dimensions of the Soul" (מקום וזמן בממדי הנפש), given by Rav Ginsburgh. See also Eliezer Zeiger's "Time, Space, and Consciousness" in the *B'Or Hatorah Journal*, vol. 15, which is based on some of the insights offered by Rav Ginsburgh in that lecture series.

⁸. The four letters of God's essential Name, also known as the Tetragrammaton are: *yud* (י), *hei* (ה), *vav* (ו), *hei* (ה). For a more complete discussion see *What You Need to Know About Kabbalah*, pp.

⁹. *Tamid*, 32a. איזהו חכם? הרואה את הנולד.

¹⁰ Job 28:12. ואי זה מקום בינה.

¹¹. תרין רעין דלא מתפרשין לעלמין.

(*yichuda ila'ah*). And he put together energy and matter, which is the unification of the bottom two letters of God's essential Name, *vav* and *hei*—this is called the lower unification (*yichuda tata'ah*). What came out of this unification is first of all the space and time became one thing. This corresponds to the unity of the first two letters of God's essential Name, *yud* and *hei*. Then he unified energy and matter, the two final letters of God's essential Name. But then came the truly innovative result, which is that space and time, which before were, let us call it transcendent, and did not take part in the exchanges of energy and matter, now because of the fact that space and time became one and energy and matter became one, they were understood to be affected by events involving matter and energy.

In Kabbalah and Chassidut, this then corresponds to the manner in which the lower unification affects the higher unification. This is called the drawing of *mochin*, or brain-power, or life-force from the father and mother principles, which correspond to time and space as they are unified together, into the lower levels of energy and matter, which correspond to the lower unification.¹² Space and time change based on events that take place in the realm of energy and matter, which have now become one.

Now we will see something interesting about these four words (time, space, energy, and matter) as they are written in Hebrew: זמן מקום כח חמר. If we look at the middle letters of these four words we see that they are: זמן מקום כח חמר. The middle letters together spell the word מקום, which means "space." What this is telling us is that it is specifically space (which as we mentioned corresponds to the mother principle, to the first *hei* of God's essential Name) that unites all four of these concepts. This is similar to what the Ba'al Shem Tov said that there is an inner point of zero, of nothingness, within everything, that if you connect to it, you can be drawn up to a higher level. Indeed, more than the word for "time" (זמן), the word מקום, in Hebrew, is one of the connotations of the Almighty. For example as we say in the Hagadah of Passover, ברוך המקום ברוך הוא "Blessed is the space [God], blessed is He." The word for time, zman (זמן), has many Kabbalistic gematrias and explanations, nonetheless, it is not a connotation of God. So there is something about space that is more Divine, more primordial, than even time. Kabbalah teaches that time is more inner than space, but time enters space, which

¹². More explicitly, Kabbalah teaches that the lower unification excites the higher unification to provide it with new life-force. This is similar to the manner in which energy/matter affects space-time, which in return affects energy/matter.

is more primordial. If there were space without time, it would be a continual present, there would be no flow of time.

Actually, vis a vis a ray of light, there is only space, there is no time. There is a famous explanation of this idea that says that a ray of light that leaves the sun takes 8 and a half minutes to reach Earth. But, light is not said to travel with infinite velocity, it is said that light never left the sun. But it did leave the sun.

Let us explain it like this: if we have a ray of light that left some far away star so many light years ago, it has left. But, we say that the ray of light is really still in that star, it is still clinging to its source, to the star from which it emerged. Why is this so? Because there is no time! Even though the light has definitely spread into space, its traversed space, nonetheless it is still clinging to the sun. If the light would experience time, it would have left the sun. But since there is no experience of time, there is no time lapse; no time has passed from when it left to when it reached its destination so it is instantaneously both at its starting point and at its ending point. So, the light is still clinging to its source. This is a very important concept in Chassidic teachings which is called that the "light is still clinging to its source."¹³ This most important principle in Chassidic teachings, which states that no matter what, the light still clings to its source, is thus the equivalent of the special theory of Relativity. What this itself means is that there is space without time. Once more, space is in a certain sense, more essential than time. When time enters space, it becomes the male presence within the female. But space is primordial than time, which is why it is a connotation of the Almighty. And what happens in special Relativity, is that both together become the *mochin*, part of the experience or the reality of *ze'er anpin*.

Let us go back to the BA'AL SHEM TOV's saying, that no matter what you say, I can always find a loophole. No matter theory you might come up with. This loophole in the theory can be likened to

¹³. האור דבוק במאור. Technically, this term is used in conjunction with the Arizal's notion of the contraction. In Chassidut, which argues that the contraction is only figurative, not literal, it is explained that though the God reveals Himself in only a limited manner in the world, dubbed His light, nonetheless, the revelation, the light, is still "clinging," i.e., inherently related to the source, i.e., God Himself. Thus, God's Presence is permanent and only concealed. For a more in depth explanation of this topic, see Rav Ginsburgh's Hebrew volume: *Chasdei David*, vols. 11-12, *Sod Hatzimtzum*.

a very important idea that comes out of the General theory of Relativity—the black hole.

A black hole cannot be observed, by definition. Nonetheless, most scientists believe that they exist. It is even theorized that at the center of our own galaxy, the Milky Way, there is a gigantic black hole that is 2.5 million times more massive than our own sun.

Some scientists even claim that a black hole even creates a new universe. A black hole is a parent of a new universe. This is exactly what the Ba'al Shem Tov said. To say that a theory has an internal contradiction is just a philosophical statement. Now we are seeing that there is an actual, a physical "nothing" is theorized to exist at the center of our physical reality. So the physical black hole at the middle of a galaxy is like the potential nothing that creates a new something. This is just like how the loophole in every theory is what originates the next theory.

We said that scientists do not learn from experience, they are not wise. Because of they learnt from experience they would know that every theory has fallen to the next one. Why do scientists not understand this? This idea is even more pronounced in mathematics. In mathematics, which is much more theoretical than science, this has been proven, in what is called Gödel's theorem. This theorem states that given any axiomatic mathematical system there is always an inconsistency, a black hole.¹⁴ So if Gödel already proved that every mathematical structure has its own black hole, why not do the same for science? Why not prove that every scientific theory has a black hole by definition. Meaning, that not only would we be learning from experience that every theory has a black hole, but to also prove that this is the case.

It is one thing to learn from experience that you will always be wrong. The next stage is not just to learn this, but to prove that this is the case.

Once more, the black hole is the physical model of the Ba'al Shem Tov's loophole. In String Theory a galaxy and a photon are considered equivalent, something that we will also explain later. Everything has its black hole, even the smallest thing has a point of nothingness inside.

So we have our black hole analogy, and our saying from the Ba'al Shem Tov and we have Gödel's proof. This was definitely,

¹⁴. More exactly, there can be shown to be at least one theorem which is known to be derivable from the axioms, but nonetheless, because of its paradoxical nature, cannot be proven to be true based on the same axioms.

without question, the most important mathematical discovery of the 20th century.

In the end, what this all boils down to is that there is only one way out which is akin to the exodus from Egypt—i.e., riding God's beam of light, which makes us into real movers amongst all those standing.