

A New Kind of Matter that Bends the Laws of Physics – A Spiritual Insight

By MATSATI - March 6, 2021



Scientists recently have reported [1] on a novel state of active matter known as a "*swirlonic state*." In this new state of matter, quasi-particles form a swirlon by groups orbiting their common center of mass. Now in response to an external load, these groups of particles move with a constant velocity proportional to the applied force, similar to that of viscous liquids ($F = \mu A u/y$). These groups of particles are said to coalesce forming a larger joint swirlon.

References

1. Nikolai V. Brilliantov, Hajar Abutuqayqah, Ivan Yu Tyukin & Sergey A. Matveev, "*Swirlonic state of active matter*," *Scientific Reports* volume 10, Article number: 16783 (2020) <https://www.nature.com/articles/s41598-020-73824-4>

Scientists used simulations and theoretical analysis to model these properties and the experimental work agrees qualitatively and quantitatively with the simulation results. The researchers are looking at running further simulations that are more complex with information-processing abilities. This will lead to the model being more representative of the real world and may produce data that explains more closely the physical laws governing schooling, swarming, and flocking found in the animal kingdom. The outcome of this type of research is related to developing self-assembling materials. The research will demonstrate the differences between "*active matter*" and "*passive matter*" and the phases of these kinds of matter.

The concept of "*active matter*" is related to biological systems, as the matter that has the ability to exhibit motion and perform mechanical work at the expense of metabolic energy. The active matter consumes energy from the environment and moves beyond equilibrium

configurations. Biological systems are an example of this type of behavior. Swirlons behave like individual super particles with surprising properties. They attract each other, coalesce upon collision, forming larger systems. When an external force is applied it moves in the direction of the force with a constant velocity proportional to the applied force. This is similar to the classical viscous medium. The steady velocity of the swirlon is inversely proportional to the mean-square velocity of the orbital motion of particles that comprise the swirlon. The swirlonic state is not stable but transient as the mobility of the swirlons decay with mass. Researchers say as a result, the swirlons eventually collapse into a single milling structure. However, the mobility of the heavy swirlons drastically decreases which suggests for larger systems, there is a diverging transient time from the swirlonic state to the single milling state. This makes the swirlonic state of particular interest! Note that a milling state is where the particles create enough mechanical energy to physically break down particles to finer particles. The research paper [1] concludes that the dimension of swirlons is almost independent of the number of particles inside of it and determined by the intensity of the self-driven and inter-particle forces. The particular properties of the swirlons, such as the continuous aggregation of particles, the process of coalescence upon collision decreases as the mass of the swirlons grows larger and larger. They investigated the presence of swirlons in gas, liquid, and solid states, which are well known for molecular systems. They discovered that for the gaseous state, the active matter occupies all of the available space. In the liquid state, the active matter occupies only part of the space. They did not observe the coexistence of multiphase systems (i.e. gaseous + liquid phases) which is common for molecular systems. The theoretical models were in good agreement with the predictions of the theory based upon the simulation results.

The Spiritual Insights that we receive from this type of research is found in the swirlon behavior and our relationship with God and one another (community). The idea here is the swirlons produced different types of properties in this agglomeration or self-assembly of particles, whereas the community (referring to people) also has many mutual benefits such as what we are studying here in the scientific research. When performing a search on what the scriptures say about community, there were a significant amount of search results (many Scriptures). The following is only a short list:

HEBREWS 10:24-25 AND LET US CONSIDER HOW TO STIR UP ONE ANOTHER TO LOVE AND GOOD WORKS, NOT NEGLECTING TO MEET TOGETHER, AS IS THE HABIT OF SOME, BUT ENCOURAGING ONE ANOTHER, AND ALL THE MORE AS YOU SEE THE DAY DRAWING NEAR. (ESV)

GALATIANS 6:2 BEAR ONE ANOTHER'S BURDENS, AND SO FULFILL THE LAW OF CHRIST. (ESV)

ECCLESIASTES 4:9-12 TWO ARE BETTER THAN ONE, BECAUSE THEY HAVE A GOOD REWARD FOR THEIR TOIL. FOR IF THEY FALL, ONE WILL LIFT UP HIS FELLOW. BUT WOE TO HIM WHO IS ALONE WHEN HE FALLS AND HAS NOT ANOTHER TO LIFT HIM UP! AGAIN, IF TWO LIE TOGETHER, THEY KEEP WARM, BUT HOW CAN

ONE KEEP WARM ALONE? AND THOUGH A MAN MIGHT PREVAIL AGAINST ONE WHO IS ALONE, TWO WILL WITHSTAND HIM—A THREEFOLD CORD IS NOT QUICKLY BROKEN. (ESV)

***ACTS 2:42-47** AND THEY DEVOTED THEMSELVES TO THE APOSTLES' TEACHING AND THE FELLOWSHIP, TO THE BREAKING OF BREAD AND THE PRAYERS. AND AWE CAME UPON EVERY SOUL, AND MANY WONDERS AND SIGNS WERE BEING DONE THROUGH THE APOSTLES. AND ALL WHO BELIEVED WERE TOGETHER AND HAD ALL THINGS IN COMMON. AND THEY WERE SELLING THEIR POSSESSIONS AND BELONGINGS AND DISTRIBUTING THE PROCEEDS TO ALL, AS ANY HAD NEED. AND DAY BY DAY, ATTENDING THE TEMPLE TOGETHER AND BREAKING BREAD IN THEIR HOMES, THEY RECEIVED THEIR FOOD WITH GLAD AND GENEROUS HEARTS, ... (ESV)*

***ROMANS 12:3-13** FOR BY THE GRACE GIVEN TO ME I SAY TO EVERYONE AMONG YOU NOT TO THINK OF HIMSELF MORE HIGHLY THAN HE OUGHT TO THINK, BUT TO THINK WITH SOBER JUDGMENT, EACH ACCORDING TO THE MEASURE OF FAITH THAT GOD HAS ASSIGNED. FOR AS IN ONE BODY WE HAVE MANY MEMBERS, AND THE MEMBERS DO NOT ALL HAVE THE SAME FUNCTION, SO WE, THOUGH MANY, ARE ONE BODY IN CHRIST, AND INDIVIDUALLY MEMBERS ONE OF ANOTHER. HAVING GIFTS THAT DIFFER ACCORDING TO THE GRACE GIVEN TO US, LET US USE THEM: IF PROPHECY, IN PROPORTION TO OUR FAITH; IF SERVICE, IN OUR SERVING; THE ONE WHO TEACHES, IN HIS TEACHING; ... (ESV)*

***1 THESSALONIANS 5:14** AND WE URGE YOU, BROTHERS, ADMONISH THE IDLE, ENCOURAGE THE FAINTHEARTED, HELP THE WEAK, BE PATIENT WITH THEM ALL. (ESV)*

***MATTHEW 18:20** FOR WHERE TWO OR THREE ARE GATHERED IN MY NAME, THERE AM I AMONG THEM." (ESV)*

Notice what these scriptures say concerning community (i) that community stirs up one another to love and good works (Hebrews 10), (ii) community helps us to bear one another's burdens, (iii) community helps us to lift one another up when we fall, the example is drawn to two laying together and keeping warm, and a threefold cord not being torn. (iv) Community helps one another, as Acts 4 speaks of how the people helped one another who were poor and in need. (v) Paul wrote that the community of believers are made up of

various parts (i.e. gifts given from God) which are to be used in service to the Lord and to one another. (vi) Paul also wrote that the community stirs up those who are idle, encourages, and helps the weak. (vii) Yeshua spoke of community in relation to prayer. Something to note is that community is a Torah centric principle as being a part of the original promise to Abraham according to *Parashat Lech Lecha in Bereshit / Genesis 12*.

ספר בראשית פרק יב

א וַיֹּאמֶר יְהוָה אֶל-אַבְרָם לֵךְ-לְךָ מֵאֶרֶץ וּמִמּוֹלֶדְתְּךָ וּמִבֵּית אָבִיךָ אֶל-הָאָרֶץ אֲשֶׁר
אֶרְאֶה: ב וְאֶעֱשֶׂךָ לְגוֹי גָּדוֹל וְאֶבְרַכְךָ וְאֶגְדְּלָה שְׁמֶךָ וְהָיָה בְרַכָּה

BERESHIT / GENESIS 12:1-4

12:1 NOW THE LORD SAID TO ABRAM, 'GO FORTH FROM YOUR COUNTRY, AND FROM YOUR RELATIVES AND FROM YOUR FATHER'S HOUSE, TO THE LAND WHICH I WILL SHOW YOU; 12:2 AND I WILL MAKE YOU A GREAT NATION, AND I WILL BLESS YOU, AND MAKE YOUR NAME GREAT; AND SO YOU SHALL BE A BLESSING; (NASB)

Here the Lord God spoke of making Abram a great nation (וְאֶעֱשֶׂךָ לְגוֹי גָּדוֹל). The promise to Abraham goes on to a blessing that will proceed to all the world. If we bless, God will bless (וְאֶבְרַכְךָ מְבַרְכֶּיךָ), if we curse, God will curse (וּמִקְלָלְךָ אָרֶר), notice how the promise speaks to community in the sense of blessing one another in blessing the children of Abraham, and all of the families of the earth will be blessed (וְנִבְרַכְוּ בְּךָ כָּל מִשְׁפַּחַת הָאָדָמָה). It is in this way that the community helps us to grow, to become stronger, to build one another, pray for one another, etc. (Ephesians 6:18, James 5:16). As the children of God, these things lead to our worshipping and praising the Lord! These things also describe why we are not supposed to be simply spectators in the community of believers. Each of us has our part as praying for one another, encouraging one another, helping one another, etc.

When we talk about our faith being an active part of our lives, this means that we are not to approach our faith as a spectator. Modern television has caused our culture and society to become people who want to watch life play out, or watch others take active roles in life or science fiction and we sit back and enjoy the show. This approach has unfortunately become a part of the life of faith as well. It is in my experiences that most people would rather merely watch others perform, as in watching others pray and take active roles in worship and preaching, as opposed to actually being involved themselves. The Scriptures speak however of having more of an active role, as followers gather together to worship, pray, and serve, and take the gospel message into the world such that God's glory may be displayed through the unity and love that is demonstrated among the members. We note how Abraham took an active role in speaking about the one true God and adding people to his numbers as a result.

ספר בראשית פרק יב

א וַיֹּאמֶר יְהוָה אֶל-אַבְרָם לֵךְ-לְךָ מֵאֶרֶץ וּמִמּוֹלַדְתְּךָ וּמִבֵּית אָבִיךָ אֶל-הָאֶרֶץ אֲשֶׁר
 אֵרָאֶךָ: ב וְאָעֲשֶׂךָ לְגוֹי גָּדוֹל וְאֶבְרַכְךָ וְאֶגְדַּלְהָ שְׁמִי וְהָיָה בְרָכָה: ג וְאֶבְרַכְהָ
 מִבְּרַכְיֶיךָ וּמִקְלָלֶיךָ אֲדָר וְנִבְרַכְוּ בְּךָ כָּל-מִשְׁפַּחַת הָאָדָמָה: ד וַיֵּלֶךְ אַבְרָם כַּאֲשֶׁר דִּבֶּר
 אֵלָיו יְהוָה וַיֵּלֶךְ אִתּוֹ לוֹט וְאַבְרָם בֶּן-חֲמִשׁ שָׁנִים וְשִׁבְעִים שָׁנָה בָּצִאתוֹ מִחָרָן: ה
 וַיִּקַּח אַבְרָם אֶת-שָׂרִי אִשְׁתּוֹ וְאֶת-לוֹט בֶּן-אָחִיו וְאֶת-כָּל-רְכוּשָׁם אֲשֶׁר רָכָשׁוּ
 וְאֶת-הַנֶּפֶשׁ אֲשֶׁר-עָשׂוּ בְּחָרָן וַיֵּצְאוּ לָלֶכֶת אֶרֶץ כְּנָעַן וַיָּבֹאוּ אֶרֶץ כְּנָעַן:

BERESHIT / GENESIS 12:1-5

12:1 NOW THE LORD SAID TO ABRAM, 'GO FORTH FROM YOUR COUNTRY, AND FROM YOUR RELATIVES AND FROM YOUR FATHER'S HOUSE, TO THE LAND WHICH I WILL SHOW YOU; 12:2 AND I WILL MAKE YOU A GREAT NATION, AND I WILL BLESS YOU, AND MAKE YOUR NAME GREAT; AND SO YOU SHALL BE A BLESSING; 12:3 AND I WILL BLESS THOSE WHO BLESS YOU, AND THE ONE WHO CURSES YOU I WILL CURSE. AND IN YOU ALL THE FAMILIES OF THE EARTH WILL BE BLESSED.' 12:4 SO ABRAM WENT FORTH AS THE LORD HAD SPOKEN TO HIM; AND LOT WENT WITH HIM. NOW ABRAM WAS SEVENTY-FIVE YEARS OLD WHEN HE DEPARTED FROM HARAN. 12:5 ABRAM TOOK SARAI HIS WIFE AND LOT HIS NEPHEW, AND ALL THEIR POSSESSIONS WHICH THEY HAD ACCUMULATED, AND THE PERSONS WHICH THEY HAD ACQUIRED IN HARAN, AND THEY SET OUT FOR THE LAND OF CANAAN; THUS THEY CAME TO THE LAND OF CANAAN. (NASB)

Here in Bereishit / Genesis 12:5 the sages interpret Bereshit / Genesis 12:5, וַיִּקַּח אַבְרָם, אֶת-שָׂרִי אִשְׁתּוֹ וְאֶת-לוֹט בֶּן-אָחִיו וְאֶת-כָּל-רְכוּשָׁם אֲשֶׁר רָכָשׁוּ וְאֶת-הַנֶּפֶשׁ אֲשֶׁר-עָשׂוּ בְּחָרָן וַיֵּצְאוּ לָלֶכֶת אֶרֶץ כְּנָעַן וַיָּבֹאוּ אֶרֶץ כְּנָעַן: where a midrash speaks specifically on וְאֶת-הַנֶּפֶשׁ אֲשֶׁר-עָשׂוּ בְּחָרָן saying that here this shows Abraham made converts. This may answer one of the reasons the reasons why Abraham camped in between Bethel and Ai first when traveling to the promised Land according to Bereshit / Genesis 12:8, וַיֵּצֵא מִשָּׁם הַהִרָה מִקֶּדֶם לְבֵית-אֵל וַיֵּט אֹהֶלָה בֵּית-אֵל מִיָּם וְהָעִי, *Then he proceeded from there to the mountain on the east of Bethel, and pitched his tent, with Bethel on the west and Ai on the east; and there he built an altar to the Lord and called upon the name of the Lord. (NASB)* This was for the purpose of making converts. Note the parallel to going into the world and teaching the good news and what Rashi states about Abraham.

RASHI ON BERESHIT / GENESIS 12:5, PART 1

אשר עשו בחרן. שהכניסן תחת כנפי השכינה; אברהם מגיר את האנשים ושרה מגירת הנשים, ומעלה עליהם הכתוב כאלו עשאום; ופשוטו של מקרא עבדים

וּשְׁפָחוֹת שִׁקְנוּ לָהֶם, כְּמוֹ עֲשָׂה אֶת כָּל הַכָּבֹד הַזֶּה (שם ל"א), וְיִשְׂרָאֵל עָשָׂה חֵיל
(במדבר כד יח), לְשׁוֹן קוֹנֶה וְכוּנֶה:

אשר עשו בחרן [THE SOULS] THAT THEY HAD GOTTEN (LITERALLY, MADE) IN HARAN – THE SOULS WHICH HE HAD BROUGHT BENEATH THE SHELTERING WINGS OF THE SHECHINAH. ABRAHAM CONVERTED THE MEN AND SARAH CONVERTED THE WOMEN AND SCRIPTURE ACCOUNTS IT UNTO THEM AS IF THEY HAD MADE THEM (GENESIS RABBAH 39:14). HOWEVER, THE REAL SENSE OF THE TEXT IS THAT IT REFERS TO THE MEN-SERVANTS AND TO THE MAIDSERVANTS WHOM THEY HAD ACQUIRED FOR THEMSELVES. THE WORD "עשה" IS USED HERE AS (IN GENESIS 31:1), "HE HAS ACQUIRED (עשה) ALL THIS WEALTH", AND (NUMBERS 24:8), "AND ISRAEL ACQUIRES (עושה) WEALTH" – AN EXPRESSION FOR ACQUIRING AND AMASSING.

These things speak to the faith of Abraham and Sarah as helping Abraham convert pagans to faith in the one true God. In addition, *Midrash Ein Ya'akov on Bereshit / Genesis 12:5* states "Resh Lakish said: 'He who teaches the Torah to his neighbor's son, is considered by Scripture as if he had created him,' as it is said: (Bereshit / Genesis 12:5) 'And the persons they had obtained Charan.'" It is easy to see how the swirly behavior mentioned in the scientific research draws out the from the Scriptures in regard to our faith as being active and not passive. We can summarize the promises God made to Abraham (Bereshit / Genesis 12:2-7, 13:14-18, 15:3-7, 15:18-21, 17:1-8) by the following:

- From Abraham God will make a great nation ✓
- God will bless him and make his name great ✓
- God will bless those who bless him and curse those who curse him ✓
- In Abraham all the families of the earth will be blessed ✓
- All the land that Abraham could see and walk in will be given to him and his offspring forever ✓
- Abraham's offspring would be as numerous as the dust of the earth and the stars ✓
- The boundaries of the land given to the offspring will be from the Nile to the Euphrates ✓
- Abraham will be a father of many nations ✓
- Nations and kings will come from Abraham ✓
- The covenant between Abraham and God, and God and Abraham's offspring will be an everlasting covenant ✓
- The land of Canaan will be an everlasting possession for Abraham and his offspring ✓

We note how these promises speak to this phenomenon as becoming a people who influences the world. In fact, as a holy people, and as a community, we have specific properties that should draw others to the God who is in heaven! Our lives and our faith

should not be just a spectator sport, and Abraham is our example. These things mean that the community helps us to move beyond the superficial and selfish desires of our hearts. The power of God in our lives by faith in Yeshua and receiving the Holy Spirit of God into our hearts also empowers us to do these things. Our relationship with God takes us into real community, communication, discussion, and challenges all of which are meant to "prevent" us from having a life that is NOT representative of the Messiah. We are supposed to have a life that is representative of the Messiah as our natural tendencies tend to produce in a person thoughts and behaviors that are contrary to the things we have been discussing in this study. The Scientific research helps us to find more reasons for believing in the God of Israel and His Messiah Yeshua as adding great value and purpose to our lives!

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Dr. Duane D. Miller received his Ph.D., M.S., and B.S. Degree in Chemical Engineering from The University of Akron Ohio. He is currently a Chemical Engineering Researcher. Duane's research expertise has focused upon functional materials development for the control, conversion, and release of process gases in Energy production technologies. His R&D interests include computational chemistry, developing novel technologies for converting biomass to fuels and studying their fundamental interactions during the chemical conversion process. His past experience includes sorbent development for pre- and post-combustion CO₂ and SO₂ capture, selective absorption of H₂S from methane streams, O₂ capture for oxy-fuel combustion, photocatalytic reduction of alcohols, NO_x reduction catalysis, the development of oxygen carriers to combust fossil fuels (CH₄ and coal) for the chemical looping combustion processes, and the extraction of rare earth elements using patent pending sorbents. His research expertise has focused on operando-characterization using Infrared, Raman, and UV-Vis spectroscopy to observe the nature of the catalytic active sites and reaction intermediates under realistic reaction conditions, allowing direct correlation of molecular/electronic structures with catalyst performance during Gas-Solid / Liquid-Solid Adsorption and Photocatalytic Processes with real time online analysis of reaction products using ICP-MS and mass spectrometry. His current work involves a multi-disciplinary approach to developing, understanding, and improving the catalytic gasification of coal and methane, high temperature chemical looping combustion, and the catalytic decomposition and gasification of biomass and coal using novel microwave reactor. He has been studying the Hebrew Scriptures and the Torah for 20+ years and sharing what he has learned. The studies developed for MATSATI.COM are freely to be used by everyone, to God be the Glory!

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