

CHARLIE JADE

**Season Two
Episodes 21 – 34**

**An Insider's Guide To Alternative
Realities.**

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In The Beginning. Season One:

The first season of CHARLIE JADE the series, dealt with our hero Charlie Jade and a host of supporting characters caught up in his adventures. It also introduced the existence of three parallel universes called ALPHAVERSE, BETAVERSE, and GAMMAVERSE.

In Season One, BETAVERSE is our known universe, and the setting there is our Earth and specifically Cape Town, South Africa. When we pick up the story we are one half-hour from now and the planet is as we currently know it.

Our main setting in the universe called ALPHAVERSE is Cape City--a parallel Earth to ours. Cape City is a massive city of countless millions in what would be geographically our African continent. It is a dark industrial centre in a global society controlled by five large corporations charged with the commercial and social administration of the entire planet.

The largest and most powerful of these corporations is called VEXCOR TECHNOLOGIES, founded by Brion Boxer, a man who not only discovered the existence of parallel universes but also found a way to travel between them. His plan was to exploit their natural resources (specifically Gammaverse's unlimited fresh water), fully recognizing the tremendous commercial potential. Such commercial potential, however, could be maximized only so long as the resources remained a company secret.

The GAMMAVERSE setting is on another parallel Earth, again in the geographic equivalent of southern Africa. There is no city used, as that world's environment is more rural and coastal. What sets Gamma apart from both Beta and (to a much greater extent) Alpha is its dedication to "sane" population controls permitting a far healthier and unspoiled environment. Of course, there is a price to pay for utopia: the populace's private lives are strictly regulated.

All three universes shared a common timeline that began with The Big Bang, occurring in all three simultaneously. History evolved in all three along similar but different paths as their evolutions unfolded.

As the series began, Vexcor was on the brink of secretly linking all three universes, ignoring the potential dangers to millions of innocent lives. But an act of explosive sabotage in Gammaverse, (the end-of-the-line in the alignment of universes), created a chain reaction in Beta and Alpha, trapping both Charlie and Reena in Cape Town. As a result of these events, Vexcor's operations were cut off in all three parallel places, endangering the company's survival.

The balance of the first season focused on the struggles of all the characters not only to find their way home, but to find their correct place in the natural order of the universes. As a result of these adventures, each character evolved, matured, and changed. It concluded with the discovery of LINK SPACE and THE MEN IN THE GREY SUITS.

The Men in the Grey Suits are beings from over-the-horizon. They refuse to be bound by either our laws of physics or our universally accepted measurements of time and space. They are aware of what has happened and what is to be, and they seem especially concerned with the activities of Charlie Jade and 01 Boxer, as well as our planet Earth and the effects of Vexcor on the balance of things.

LINK SPACE was discovered by Charlie and 01 Boxer, at the critical moment of the safe opening of a portal between Alpha, Beta and Gamma. It is a mysterious place existing in an alternate reality outside the known laws of physics that govern our world and universe. Its discovery in episode 20 appeared to leave both Charlie Jade and 01 Boxer connected here, there, nowhere, all at the same time.

Season Two. An Upset in the Natural Order Of Things - Episodes 21 – 34:

Our second season will be a thirteen part series which focuses on the universal questions of the human condition, highlighting themes taken from our very real modern life (such as ethics, technology, business, love and war). Regardless of the overall seasonal plot or theme, what happens to our characters, week to week, will make up our saga. The most successful episodes from Season One were those which examined how the characters felt, cared, or bled. To make the episodes increasingly compelling, the human character and its frailties will be at the heart of the stories. This will be our main goal in the second season.

The Portal. New Physical Rules and Regulations:

In Season Two, the portal connecting our three universes has existed long enough to be considered ordinary by everyone in the three universes. This is the main "alternative reality" from Season One. (In Season One, there were no portals until the finale, and such a phenomenon would have shaken the psyche of the entire world.)

Free Trade exists, dominated by Alphaverse, which imports cheap labour and resources from Betaverse and Gammaverse, returning finished consumer goods with built in obsolescence. There are now sub-portals in locations better suited to trade.

The three universes interact in a manner similar to our current EU. Co-operation between societies happens at an industrial and economic level and regardless of attempts to standardize the societies, each one has retained most of the individual characteristics examined in the first season. Alphaverse, Betaverse, and Gammaverse are very much the same, but different at a core level due to the alternative reality initiated by the permanent portals that connect them. Distrust, jealousy, rivalry, and a form of racism exists between the universes that affects how the three communities interact. Alphaverse is considered the metropolis, Gammaverse the hinterland, and Betaverse as a middle class something in-between.

As the second season progresses, these rivalries will begin to eclipse industrial concerns and will grow so acute as to suggest that a real armed conflict between the communities could break out (perhaps as early as Episode 34 or 35).

Again, as in the teaser of the first episode, we begin Episode 13 on the wet streets of Alpha's Cape City. We see a man behind the wheel of the passing blue roadster on the trail of a suspect and in radio contact with Mona. Again, as he glances in the rearview mirror his voice-over introduces him to the audience as Charlie Jade. But then his face is revealed, and this is not the Charlie Jade we once knew: at that moment we recognize that he is really 01 Boxer. Or at least, he is the man who "used to be" 01 Boxer before everything changed. Things are definitely not as they were in Season One. The fabric of the universe was altered when Charlie saved Beta inside the Link Space. And the audience has only just begun to realize the "altered reality" under the new order of things.

Now that a portal exists linking Alphaverse, Betaverse and Gammaverse, a new industrial age is dawning on all three worlds. And all three worlds regard the portal as something that has always been there. Three worlds linked by a doorway between universes is now the natural order of things, and no one seems aware that it should ever have been any different. It is as normal and everyday as the division of time into seconds, minutes and hours.

Over the course of the season, we will learn that the science behind this altered reality is due to Charlie and 01's actions in Link Space. What was supposed to happen when the Vexcor Link went fully on-line (as per Krogg's theory) was the instantaneous elimination of Betaverse. *But this never happened because of the actions of Charlie and 01.*

It was the twist that The Men In The Grey Suits never expected. They knew for sure that Krogg was right, and were doing nothing to stop 01 Boxer from bringing the portal on-line in all three worlds, expecting Betaverse to disappear. What Charlie and 01 did, creating a variation in the timeline of the universes, changed the stream of known events. It altered time and history in the universes in a trillionth of a nano-second and Alpha, Beta, and Gamma became modified forever. Specifically, Betaverse survived, although it was never supposed to.

All life is altered, including that of our main characters. Because they witnessed the opening of the portal in Episode 20, by being there as it happened, the change in them is different from everyone else. Consciously and subconsciously they become aware of what happened in the original reality, but in vastly different degrees. As we pick up their stories, none have any idea what has happened or their role in the cosmic plan; none except 01, that is, who seems to know everything.

Neither Charlie, Reena, Lubinsky, Blues Paddock, Essa Rompkin, or Julius Galt realize that the natural order has been upset, that they have witnessed the new "*dawn of time*" as the link-up happened. If they could talk to each other, they would all realize they share something no one else does. It is a feeling, a suspicion, that they have experienced something but the feelings are deeply buried in the subconscious.

Each character is back in the world they were in when the story began in Episode 1. Charlie (now appearing to be 01 Boxer) in Alphaverse, along with Tukarrs, Jasmine, Essa Rompkin, and 01 Boxer (who appears to be the man we knew as Charlie Jade). Blues Paddock and Karl Lubinsky are in Betaverse's Cape Town. Reena is in Gammaverse.

Julius Galt is now heading up Vexcor in all three universes. He is the star witness in Essa's Rompkin's murder trial. She is being tried for the murder of the founder of Vexcor, Brion Boxer. This multi-episode arc will end with her acquittal and taking over Vexcor's main competition, Havecor.

Charlie and 01 Boxer have switched identities as a result of their transfusion at the end of the last season. Charlie finds himself in the role 01 Boxer played before they ever met (a wanton playboy and son of Vexcor's founder), while Boxer has become Charlie (a private detective living outside of the system). Later, we will learn that 01 was a willing participant in the reversal. His molecular mutation suffered as a result of repeated travel between the universes had become life threatening and so, to preserve his life, he agreed with the Men in the Grey Suits to go through with the identity switch. Charlie will grow to suspect that all is not right with the world, and once he connects the dots must reclaim his identity from 01 before he can accomplish anything else. 01 knows all along, and hides his understanding until Charlie forces him to admit the truth, and (through a reverse transfusion process) release and correct their identities.

While Charlie has lost his second-sight visions into parallel universes, he will soon learn he can travel between "times," interacting with characters he met in the "old reality" before he entered the Link Space (i.e., in Season One) as well as functioning in this new reality.

In this new reality, we begin to explore our characters' lives some time *before* the events of Episode 1 in Season One. Our new Charlie Jade has not yet met Katie Grayle or any of the other Season One characters other than Jasmine and Sew Sew. Similarly, there is no imminent explosion from Vexcor's activation of the link (since there is no longer any need for a "link" in this new reality, where the portal between all three worlds has made Vexcor's link irrelevant).

At first, it is only Charlie who instinctively feels that things are not as they should be. Again, he isn't sure if he is feeling what was, or anticipating what will be. He simply feels there is something wrong. He is drawn to places, hears voices, feels uneasy and confused. He can't enjoy the life that 01 had. He reaches out for help but there is no-one who understands his problems. Again, he is a one-of-a-kind, like a man who alone has visions and sees things that he later learns are from another world.

Charlie ends up drawn to our main characters (who will not know him, other than those who *would* have known 01 Boxer). He isn't sure why they are important, he just knows that they are. He struggles to find the reason he is drawn to these seemingly separate individuals from unrelated walks of life and different planets in parallel but connected universes. They are living their lives and it is only because of Charlie's (as 01) persistence that a few people begin to accept that all is not right. Eventually, some are forced to realize their involvement in the "old world order" and accept their responsibility to do something.

Only by discovering and learning from each other are they able to unmask their role in the mystery that will affect the course of history in three worlds. They convince each other that what they experienced

was not some common dream or madness, that they alone share the reason why things are as they are.

In so doing, they will come to realize the hidden, indescribable danger to all life. Their only way to do this is to understand who The Men In The Grey Suits are and what their mission is. As the season unfolds our characters (including Charlie and 01 back in their correct identities), will have to work together to defeat TMIGS.

The Men In The Grey Suits: A Study On The Effects Of The Universal Measurement Of Time On Life In Parallel Worlds.

Our heroes come to realize that The Men In The Grey Suits are on a cosmic mission--a mission to perfect life in the universes. Even if that means starting it over at the beginning, at the time of the Big Bang. That the grey suited men intend to save life by destroying it, to start again, only better, having learned from all the mistakes of the previous attempt.

Our heroes grow to learn that our universes were a test tube for cosmic evolution. A lab experiment in the stuff of life designed to achieve perfect results by trial and error. That Men In The Grey Suits are essentially, the lab technicians. This terrible secret plot endangers not only life in one universe but all life in three universes.

In the second season, the Men In The Grey Suits have a much larger and more ominous role in the workings of society. Whereas no modern mathematician or physicist has been able to prove, let alone test, the string theory, the Men In The Grey Suits are suspected of inventing and manipulating it to their own ends.

Later, we learn that Krogg's theory was actually true (see Krogg's Vexcor Special Memo #221 - The Theory Of Collapsing Universes - Episode 14 which explained how artificially connecting the universes would cause the collapse of Betaverse). Krogg was right, and Betaverse was doomed if Alphaverse and Gammaverse became linked. The Men In The Grey Suits knew it was supposed to happen that way, and they wanted it to. It is only because Charlie and 01's actions at the end of Season One that created the current conditions. They will ultimately try to use the natural elements of the known universe (shadow matter, dark matter, and dark energy*) to achieve their goals.

It is revealed that the universally accepted measurement of time into seconds, minutes, and hours is an invention of the Men In The Grey Suits. This totally integrated system became 100% accepted and common in all three universes at the same time. To a Man In The Grey Suit, time measurements were an unnecessary and restrictive law, but one they invented and introduced into Gammaverse, Betaverse and Alphaverse. In the case of Alphaverse it became critical to the workings of the marketplace, assuming that consumer products with built in obsolescence was desirable. It became the most effective and subtle way to control and direct the entire population. In Gammaverse, it was used in a different way -- to force society to prioritize the life cycle -- and contributed to decisions affecting planetary population controls.

Charlie and 01's experience in Link Space allowed them to experience life without time. In Episode 20, they are novices at how to travel and exist in a timeless environment, which is effortless to the Men In

The Grey Suits. As Season Two progresses, both Charlie and 01 will become better equipped to exploit this timeless environment that permits linear and non-linear thought and travel.

Link Space

It exists in between the dark matter of the universes. As with The Men In the Grey Suits, it operates on a different set of physical laws. It exists – but not really. It is the place where the pure intellects of Charlie and 01 merged at a critical time that altered a timeline that would have seen the Betaverse cease to exist. It is a place with no past and no future. It has no artificial time measurement system and is currently accessible to everyone, and no one.

Gammaverse

Like its society itself, Gamma was, for the most part, left untouched in Season One. In Season Two we will spend a great deal of time there. Reena will also be a part of an altered reality that assumes the portal connecting the universes was always a part of reality. Outsiders will be invading their world culturally, economically, and socially. Viewers of the first season would assume this is an aberration. Yet, due to the alternative reality, all is changed and rampant commercialism and economic exploitation of Reena's world is the norm -- definitely not what we thought we left at the end of Season One.

It is only Reena (whose consciousness was altered by the Men in the Grey Suits in Season One) that will try to fight the onslaught. It is a lonely fight she is losing and she isn't even sure what she is fighting for; she just knows she must and that there is a better world out there unspoiled.

Dwellers of Gammaverse will be willing participants in the "invasion" of their world, having been encouraged by the companies and their advertisers to increase the population base thereby increasing the consumerism base. In spite of all logic to the contrary, young people buy into the sell-job, rejecting acceptable population controls and fighting to take corporate jobs in Cape City. When the numbers of births and consumer spending fall short of acceptable corporate projections, a mysterious flu-like virus is discovered that appears to be a mutant strain of the bubonic plague. The ensuing panic is used as a tool for the long-term economic plan to modify the hinterland. It will be Reena who discovers that the virus is a man-made, "nano-tech" weapon unleashed on her community from a small backroom lab in Betaverse

Reena, and a select few discover the truth behind the entire plan. They trace it back to a co-production treaty between Vexcor and Havecor in Alphaverse. Those companies recognized fear could be a powerful means of control, and so Galt and Rompinkin employed exactly that in an attempt to save their company. Reena does everything she can to alert the population to resist this manipulation and economic slavery. She is ignored.

The writing on the wall for this society is clearly drawn with the arrival of the Ectoskin devices. Only this time the devices are not the observer/camera variety but the hunter/killer advanced type, introduced in Papa Louis' apartment in Episode 17. These devices are sent among the population to seek out enemies of Vexcor.

Vexcor

Vexcor had been a traditional leader in maintaining operations in all three universes. Now its biggest problem is technology proliferation. Individuals from all three worlds are working outside industrial regulations and patents, which were easy to control in Alphaverse, threatening Vexcor's monopoly over such technology and goods. This new competition in homemade technology is not from another industrial giant, but from tiny firms and individuals that operate outside the corporate structure. Without offices and labels their activities are eroding the traditional portal driven market a little more each day. In Season Two the company is even bigger, and deadlier. It has defeated all the competition except Havecor, a company headed by Essa Rompkin, having been acquitted of Brion Boxer's death.

The initial episodes are dominated by a bloody merger of the two surviving companies creating the biggest corporation of all. A new leaner Vexcor, but the two boards decide not to give total power to either Galt or Rompkin. In the battle of corporate giants we see a ruthless side of Galt only hinted at in the first season.

The ensuing power struggle will affect every decision and every meeting, as Rompkin and Galt plot and scheme to destroy the other and still save the company. All will come to a head when Galt uses 01 Boxer to back-door Rompkin. It appears he is successful until 01 is killed by Charlie.

The nano-plague plot in Gammaverse will backfire and almost cost one of the two executives their career. But just when all seems lost, the new secret "Live Forever" drug will be discovered, by accident, in a Vexcor lab. Regardless of the countless lives lost in R & D, both Rompkin and Galt recognize the tremendous profit potential the new drug will have (a consumer base that never dies) and compete to control it.

Only later, when the evil insidious side-effects of the new drug (a ZARDOZ nightmare of immortals praying for an end to life as immortality proves not such a good thing) are revealed will Galt emerge as the clear winner of the rivalry.

Using a variation of "Live Forever", Rompkin attempts to resurrect Brion Boxer for no other reason but revenge. To her horror, what she gets instead, is the son, 01. She appears vanquished until her secret role and special relationship to the Men In The Grey Suits is revealed in the climactic episodes.

Charlie Jade, 01 Boxer, And All The Rest

As the season begins, Charlie (as 01) is damaged goods and a lost soul. He is obsessed with time. How does it work, and why is there never enough of it? If he feels he has wasted a single second he flies into a rage. He is convinced that time is bondage. He is mystified by time and feels there is a secret lurking below the surface of time asking

himself how is it that units of seconds, minutes, and hours are universally accepted from town to town, country to country, universe to universe. He traces its origins back to the prayer time of the Benedictine monks.**

For Charlie, all is a mystery and he can hardly cope. He is a man living a permanent daydream and in a state of constant déjà vu. Normal life is of no consequence as he tries desperately to understand the voices, images, and visions that fill his head. Visions of a time before and not yet happened, voices of people met and still to be met. He is doing this in Cape City at a moment in time very close to when we first met him in Episode 1.

This is not a controllable state where strange visions of trains and planes can be suppressed by some green pills from Papa Louis. He is a man with one foot in Alphaverse, one foot in Betaverse, one foot in Link Space and for whom time goes not only forward but in all directions. Charlie feels like he's caught up in a cosmic event he can't understand. As in Episode 20 he "hears" back and remembers forward and tries to make sense of his feelings of dread.

In his new altered state, Charlie is drawn inexplicably to follow, track, observe a private detective operating the wet streets of Cape City. He silently watches as the private detective, driving a blue roadster, emerges from his loft apartment that he shares with his dark-haired girlfriend. Slowly, Charlie realizes he is living in the identity of 01 Boxer. Slowly, he realizes that 01 Boxer has stolen his identity!

Charlie will come to realize that the current state of the universes, linked by the portals, is unnatural and so is his role in it. He preaches to anyone who will listen to this "anti-social" opinion. Many ears at Vexcor overhear his opinions. As a result, he becomes a watched man, dangerous and different regardless of his status as his father's son and his life in three worlds becomes a state of siege.

He knows he needs help and he is drawn to the only man he thinks can help him, the man who has stolen his identity. Charlie/01 learns that the identity switch was made by 01 without Charlie's knowledge. Whereas 01 is comfortable in the role of Charlie, Charlie is ill equipped to be 01.

The initial episodes will see him drawn ever closer to 01/Charlie until he is able to force another visit to Link Space and he reclaims his original identity. The only way to reclaim what is his is to kill 01. But 01 is a difficult mouse to catch, especially when Charlie realizes that 01 is somehow able to change certain aspects of the current reality so that he inhabits new identities. 01 is able to elude Charlie by "jumping" for identity to identity, and Charlie is never entirely sure who he should be chasing...or killing. Innocent lives are lost, and Charlie becomes a murder suspect.

This will prove particularly difficult for Charlie, as Blues Paddock is the primary assigned to investigate one of the murders in Cape Town. Charlie will have as hard a time staying out of the SAP jail as convincing Blues that she was a part of the alteration of the natural order of the universe when she witnessed the opening of the portal to Betaverse. It would help if she (as well as Reena and Lubinsky) could

remember a time when there was one universe and the portal did not exist.

Things become further complicated for Charlie when he realizes that the second murder victim, this one in Cape City, is Jasmine Lee, the wife of a police detective by the name of Sew Sew Tukarrs. Tukarrs' pursuit of Charlie is tireless and never-ending, driven by rage and grief. Tukarrs was not a witness of the events at the portal opening and so he doesn't doubt the "correctness" of the current reality--he will never join the group on Charlie's side.

Meanwhile, as the real Charlie reaches out to the characters from Season One, Reena will lead the fight to save Gamma. She will become, reluctantly, an underground heroine dedicated to destroying the portal at all costs. Her struggles to save Gammaverse will be complicated by her being unable to compete with the onslaught of products, mass media, and the organization of the developers.

She will work unsuccessfully within the system trying to save her community from becoming a modern day Sodom. She will become terribly frustrated and she will meet a dark figure that will become her lover and mentor. Under his wing, she will become more desperate and violent. She will become a hunted criminal, a fugitive in a paradise world. Her frustration grows unbearable as she screams out against the injustice of events that seem to repeat themselves. Why can she not find peace? When Charlie finally reaches her and recruits her in his efforts to restore the natural order of things, she is a more than willing accomplice.

It is only in the final episodes of the season that we learn that Reena's dark teacher is Malachi. This time, if she does not succeed in killing him, he will pose a threat to Charlie that even he will be unable to withstand. Unless Malachi is stopped, Charlie will fail in his mission to re-set the universes.

Back in Cape Town, Lubinsky is locked in an insane asylum. He has never recovered from the demons that haunt him in his sleep--certain the worlds are plagued by the conspiracy he sees under every rock. He now is convinced the world is an outpost for alien controllers in Grey Suits. What he couldn't know is that his condition and confinement are a result of a pharmaceutical inducement. This attack on Lubinsky has been orchestrated by South African authorities sympathetic to Vexcor's vision of economics and free trade. Charlie will save him and release his tortured mind.

Again he will be drawn into Charlie's web and, like other characters. And what Lubinsky will learn is that nothing can be set right unless they recreate the events of the portals' opening in just the right manner. If one of the witnesses of the opening of the portal in Episode 20 is out of place, their efforts will fail.

Lubinsky and the others will have faith in what Charlie tells them if they are to do what is necessary. Again, it is Lubinsky who knows that what you do in "the here and now" is what counts. If you can stand up in spite of your fears, there is hope for us all. It is this faith that will fly in the face of the pure science of the Men In The Grey Suits.

Blues is back being a detective at the SAP in Cape Town. In this altered reality she is a detective in charge of crimes that cross universal boundaries. She is presented with a strange murder case that we learn is Charlie's. She seems obsessed in her prosecution of the case. As a result she again falls into Charlie's orbit and becomes involved in more ways than are professional. This time, though, there is murder at stake and she must choose between Charlie, her job, and made all the more difficult by the incredible nature and desperation of Charlie's story.

To make matters worse, Blues is "involved" with another. There is talk of marriage. Every moment she spends on the Charlie Jade case or in Charlie's orbit she is driven in a different direction of the heart. Charlie must convince her to throw all caution to the wind and join him or the efforts of all the others will fail.

Eventually, all come to know Charlie. Remember him. But their version of events--like all concerned--has been altered. Charlie must convince them that there is a great danger looming and that they play a critical role in it. He wins over Reena and Lubinsky, but Blues and Tukarrs are far more difficult, both being assigned to apprehend him for their respective police forces for murders he has committed.

He must convince them that the strange feelings and visions they all share have to do with a common experience in Episode 20 and they must band together in an all-or-nothing attempt to stop the Second Big Bang. All finally see the light, except Tukarrs who is blinded by a need for revenge.

To everyone's horror, they comes to realize that the only option left for Charlie is to return the universes to a place *prior* to his entering Link Space. That the portal connecting the three universes was never to be completed and that the elimination of Betaverse may be unavoidable if life is to saved everywhere else. They realize that, perhaps, The Second Big Bang has already happened in the Natural Order of Things and must always happen. This challenge is made near impossible, as 01 and Charlie have experience in the Link Space time environment, the others don't.

In the climactic episode, Tukarrs strikes out at Charlie causing the death of someone very close to Charlie. A death that no-one can return from.

As the second season reaches its climax, Charlie again realizes that he and 01 must join with The Men In The Grey Suits and make a cosmic decision that will affect all life. That he and 01 must make the biggest decision ever faced by a man. To set things right at the cost of a universe, or allow things to continue to a new cosmic beginning...at the cost of all life everywhere.

* **Dark matter** is the invisible substance that makes up most of the matter in the universe. Dark matter is invisible because it does not give off, reflect, or absorb detectable amounts of visible light, radio waves, X rays, or any other kind of electromagnetic energy. Astronomers have detected it only through its gravitational effects. They do not know its composition.

Evidence of dark matter comes from observations of galaxies. Such studies show that the *mass* (amount of matter) of any galaxy is many times larger than the mass of its stars and other visible parts. Further evidence of dark matter comes from studies of radiation left over from the *big bang* (the explosive beginning of the universe) and measurements of the rate at which the universe is expanding. Studies indicate that there is more than 30 times as much dark matter as visible matter.

Some dark matter may consist of *massive astrophysical compact halo objects* (MACHO's), bodies made of ordinary matter. Observations made since 1993 have provided evidence of MACHO's in our home galaxy, the Milky Way. The observations suggest that roughly 20 percent of the dark matter in the Milky Way consists of MACHO's, and that the mass of the individual MACHO's is about half that of the sun.

A once-favored theory suggested that most dark matter consists of subatomic particles called *neutrinos*. Galaxies probably developed from huge clumps of matter billions of years ago. At that time, neutrinos would have been traveling at almost the speed of light, earning them the name *hot dark matter*. The fast motion of the neutrinos would have smoothed out any lumps of neutrino matter that could have developed into galaxies.

Many astronomers now believe that most dark matter is *cold dark matter*, particles that moved much more slowly than light in the early universe. The particles might be *weakly interacting massive particles* (WIMP's), which would be much more massive than protons. Or they might be *axions*, which would be much less massive than electrons.

Experimenters are searching for WIMP's at underground laboratories in Minnesota, England, France, and Italy. Detectors in these laboratories are designed to sense collisions between WIMP's and nuclei of the atoms of specially prepared crystals. The laboratories are underground to avoid *cosmic rays* (streams of particles from space) that can overwhelm the detectors.

Scientists are trying to detect axions at Lawrence Livermore National Laboratory (LLNL) in California. According to theory, axions can turn into a type of radiation called microwaves inside a strong magnetic field. So the LLNL detector consists of a powerful magnet and devices that can sense microwaves.

See also DARK ENERGY; GALAXY; INTERSTELLAR MEDIUM; MATTER; NEUTRINO; SHADOW MATTER.

Contributor: Joel R. Primack, *Ph.D., Professor of Physics, University of California, Santa Cruz.*

Shadow matter is a hypothetical form of matter that is thought to interact with ordinary matter only through the force of gravity. If shadow matter exists, it is a form of *dark matter*.

Dark matter is invisible matter that scientists believe makes up most of the mass of the universe. Dark matter is invisible because it does not give off, reflect, or absorb light. Unlike other hypothetical forms of dark matter, shadow matter cannot be detected in any laboratory experiment (see DARK MATTER).

Theoretical studies have shown that if shadow matter does exist, its properties are very different from those of ordinary matter. Because of these differences, such objects as stars and planets made of shadow matter could not form.

The possible existence of shadow matter has been proposed in *superstring theories*. Physicists believe that such theories may explain the nature of all particles in the universe and of the forces that control the behavior of the particles. Superstring theories suggest that subatomic particles, including particles that transmit forces, are actually extremely short, one-dimensional strings. Theoretically, the strings are so short that they appear to be points. Until recently, scientists had assumed that subatomic particles formed tiny points.

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Dark energy is a little-understood form of energy that apparently makes the universe expand more and more rapidly. In 1917, the German-born physicist Albert Einstein discovered that such energy might exist. He made his discovery when he applied *general relativity*-his theory of space, time, and gravity-to the universe. The theory originally indicated that the universe could not remain at a constant size due to gravitational attraction between the objects in it. However, astronomers had found no evidence that the universe had ever been a different size. So Einstein added a *cosmological constant* to the theory. That term represented a *repulsion* (pushing away) of every point in space by the surrounding points, acting against gravitational attraction.

But in 1929, the American astronomer Edwin P. Hubble found that the universe is expanding. As a result, Einstein and the Dutch astronomer Willem de Sitter rejected the cosmological constant and theorized that the universe has *critical density*. Density is *mass* (the amount of matter) divided by volume. The universe has critical density if there is just enough matter in it to decrease its rate of expansion. According to this idea, the universe has been expanding since an explosive beginning called the *big bang*-but more and more slowly.

By the late 1990's, astronomers had confirmed that the universe has critical density, with matter accounting for about 30 percent of it. However, they had also found that, several billion years ago, the rate of expansion began to speed up. According to relativity theory, energy also contributes to density. Dark energy-perhaps simply the cosmological constant-can account for the increase in the expansion rate if there is enough of it to account for the remaining 70 percent of critical density.

See also BIG BANG; COSMOLOGY; DARK MATTER; DE SITTER, WILLEM; EINSTEIN, ALBERT; GRAVITATION; HUBBLE, EDWIN POWELL; RELATIVITY; UNIVERSE.

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Big bang refers to the most widely held scientific theory of the origin of the universe.

According to this theory, the universe began with a hot, explosive event—a "big bang"—about 10 billion to 20 billion years ago. At the beginning of the event, all the matter that existed was much smaller than the nucleus of an atom. Matter then expanded rapidly and is still expanding. British cosmologist Fred Hoyle originated the term *big bang* in 1950.

One key piece of evidence for the big bang is the observed amount of helium in the universe. In 1948, Russian-born physicist George Gamow and his collaborators, American physicists Ralph A. Alpher and Robert Herman, worked out in detail the nuclear reactions that would have occurred during the big bang. They found that only hydrogen and helium would have remained in any significant amounts following the first few minutes of the explosion. Their calculations indicated that about 25 percent of the mass of the normal matter now present in stars and galaxies is helium. Astronomical observations have since confirmed this calculation.

Gamow and his collaborators also determined that the big bang would have given rise to a certain kind of radiation known as *thermal radiation* or *blackbody radiation*. This radiation would then have cooled as the universe expanded. In 1965, American physicists Arno Penzias and Robert Wilson detected this radiation. They found that its temperature is about 2.7 Celsius degrees above absolute zero (-459.67 °F, or -273.15 °C), very close to what Gamow and his colleagues had calculated. The thermal radiation comes from all directions, and its temperature is almost exactly the same in all directions.

The original big bang theory does not indicate how the temperature of the radiation could have become so uniform. An added theory called *cosmic inflation* proposes an explanation, however. According to this theory, the universe expanded by an enormous amount in the early moments of the big bang. The theory shows that the inflationary expansion would have tended to smooth out temperature variations occurring over widely separated parts of the universe. Small variations in density would have led to the formation of galaxies.

Today, the universe appears to be expanding at an accelerating rate. The factor responsible for the acceleration is thought to be a repelling force that is uniformly present throughout the universe. The source of this force, called the *cosmological constant*, was first proposed by German-born physicist Albert Einstein. He made his proposal in 1917, in a paper that applied the general relativity theory to the universe.

See also COSMOLOGY; RELATIVITY; UNIVERSE.

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** In an interview conducted by **Derrick Jensen** with **John Zerzan**:

Zerzan: Time is an invention of culture. It has no existence outside of culture. The degree to which a culture is ruled by time is a pretty exact measure of alienation. Everything in our culture is measured and ruled by time.

Jensen: A clock is just about as tangible as you can get.

Zerzan: It makes time concrete; it reifies it. A second of time is nothing, and to grant it independent existence runs counter to our experience of life. "Primitive" people live in the present, as we all do when we are having fun. It has been said that the Mbuti of southern Africa believe that "by a correct fulfillment of the present, the past and the future will take care of themselves." Primitive peoples generally have no interest in birthdays or measuring their ages. As for the future, they have little desire to control what does not yet exist, just as they have little desire to control nature. This point is hard for us to grasp, because the notion of time has been so deeply imbedded in us that it's nearly impossible to imagine it not existing.

Jensen: So, you're talking about more than just not counting seconds.

Zerzan: I'm talking about time not existing. Time that continues as a continuous "thread" that unravels in an endless progression, linking all events together while remaining independent of them – that doesn't exist. But not time. As you said: Identical seconds. Identical people. Identical chores repeated endlessly. But when you realize that no two occurrences are identical, and that each moment is different from the moment before, time simply disappears. If events are always novel, then not only is routine impossible, but the notion of time is meaningless.