

A Solution For the Distant Starlight Problem Using Creation Time Coordinates

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Formulation of the Distant Starlight Problem

“If Creation occurred only a few thousand years ago, how can we see light from stars that are billions of light years away?”

The theory, which gave us the speed of light limit, also provides the solution.

Some previously proposed solutions

1. Light created already in transit (Morris 1976)
2. Variable speed of light (Setterfield 1989)
3. Gravitational time dilation (Humphreys 1994)
4. Supernatural time dilation (Hartnett 2003)
5. Anisotropic synchrony convention (ASC) model (Newton 2001; Lisle 2010)
6. Miraculous “shooting” forth of light (Faulkner 2013)

Faulkner (2013) provides a brief overview and criticism of #1-5, and Hartnett (2014) critiques #6.

Convergence of ideas

Recent convergence of ideas:

- Old visible Cosmos: Humphreys' (1994, 2008, 2017) cosmology
- Young visible cosmos: Lisle's (2010) ASC model (Lisle 2010); Hartnett's endorsement of Lisle's model (Hartnett 2011a, 2015a); Faulkner's (2013) *dasha* solution.

“Old” = billions of years,

“Young” = thousands of years

The proposed solution (further convergence):

- Is an improvement of Lisle's ASC model that specifies the initial conditions.
- Agrees with Humphreys' arrangement of stellar creation along Earth's Day Four light cone and embraces his rejection of the Cosmological Principle.

Agenda for the remainder of this talk

- Special Relativity primer (using just diagrams and no equations)
- Proposed solution
- Evidence for young visible cosmos (a testable prediction of our solution)
- Comparison with prior ideas
- Responses to potential objections

Special Relativity Primer

Special Relativity primer: *Minkowski diagrams*

E – Event

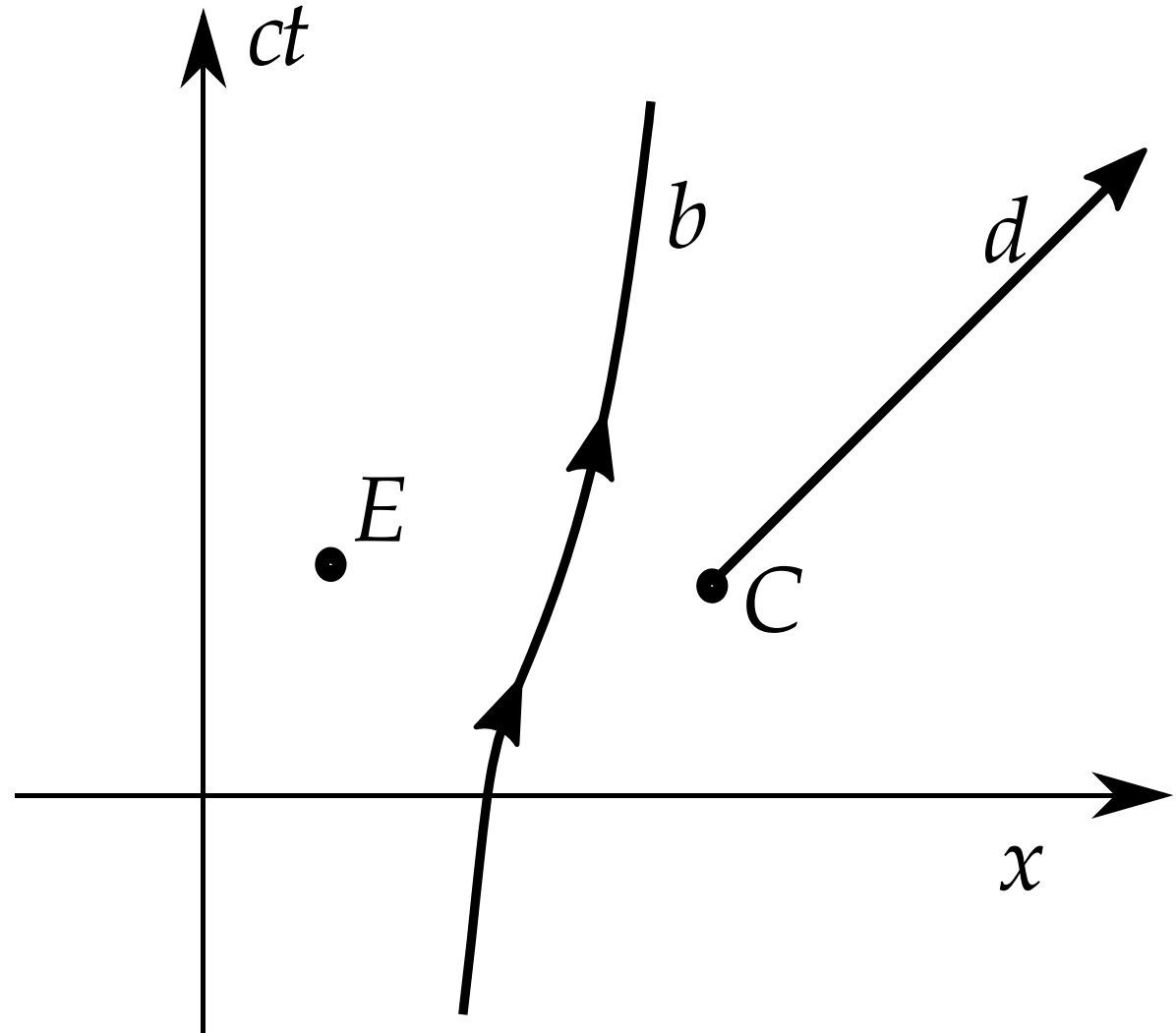
b – world line of a particle

d – beam of light emitted at event C .

Axes – an observer

ct axis – observer's world line

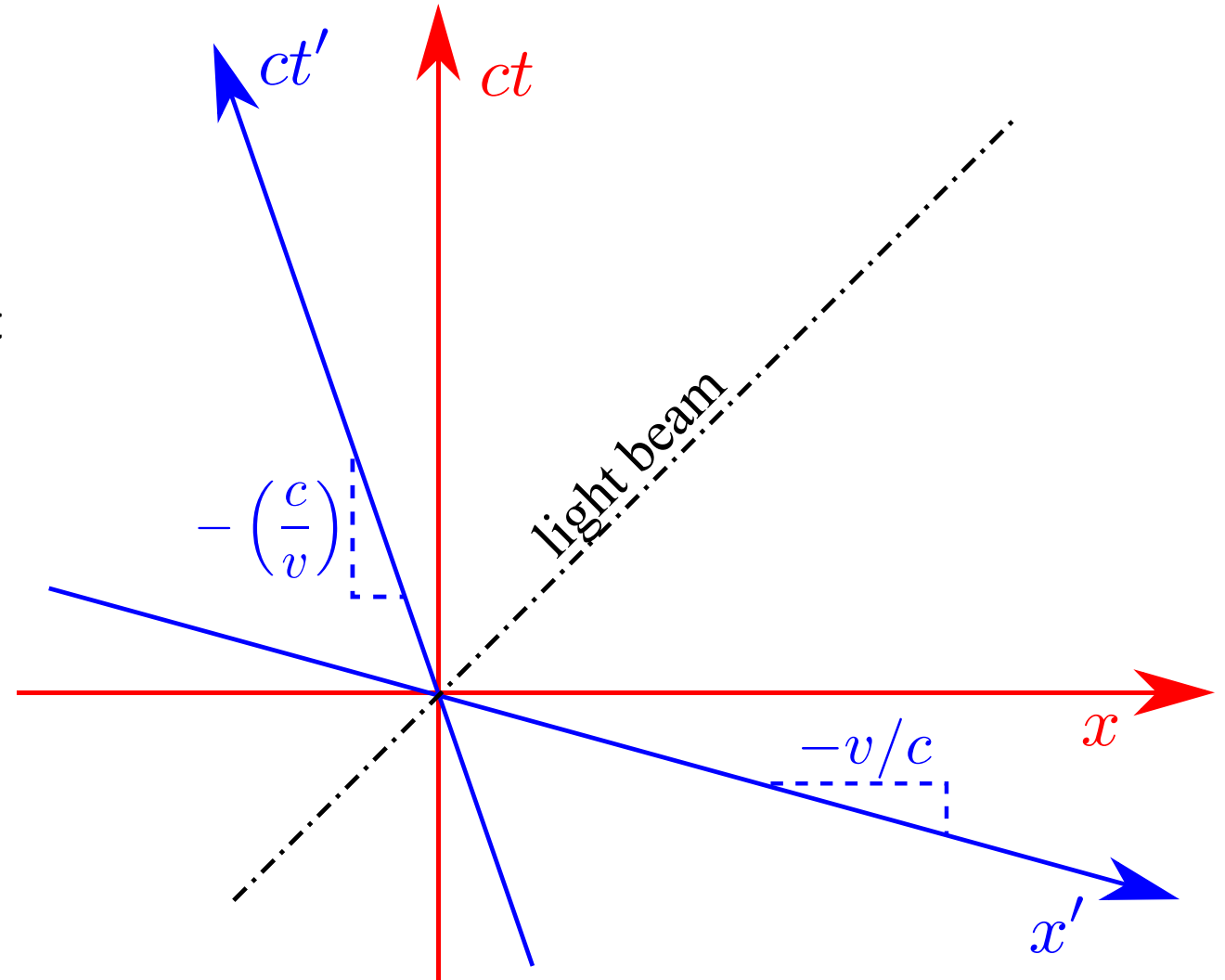
x axis – simultaneity convention



Special Relativity primer: *Each observer specifies a coordinate basis*

Primed and unprimed observers moving with speed v away from each other.

- Each time axis is the worldline of that observer. Therefore, ct' axis tilts.
- A light beam through the origin must bisect the axes angle so lightspeed can be c for both observers.
- Therefore, x' axis tilts opposite to ct'
- Each space axis defines simultaneity of events for that observer.



Special Relativity primer: *Relativity of simultaneity*

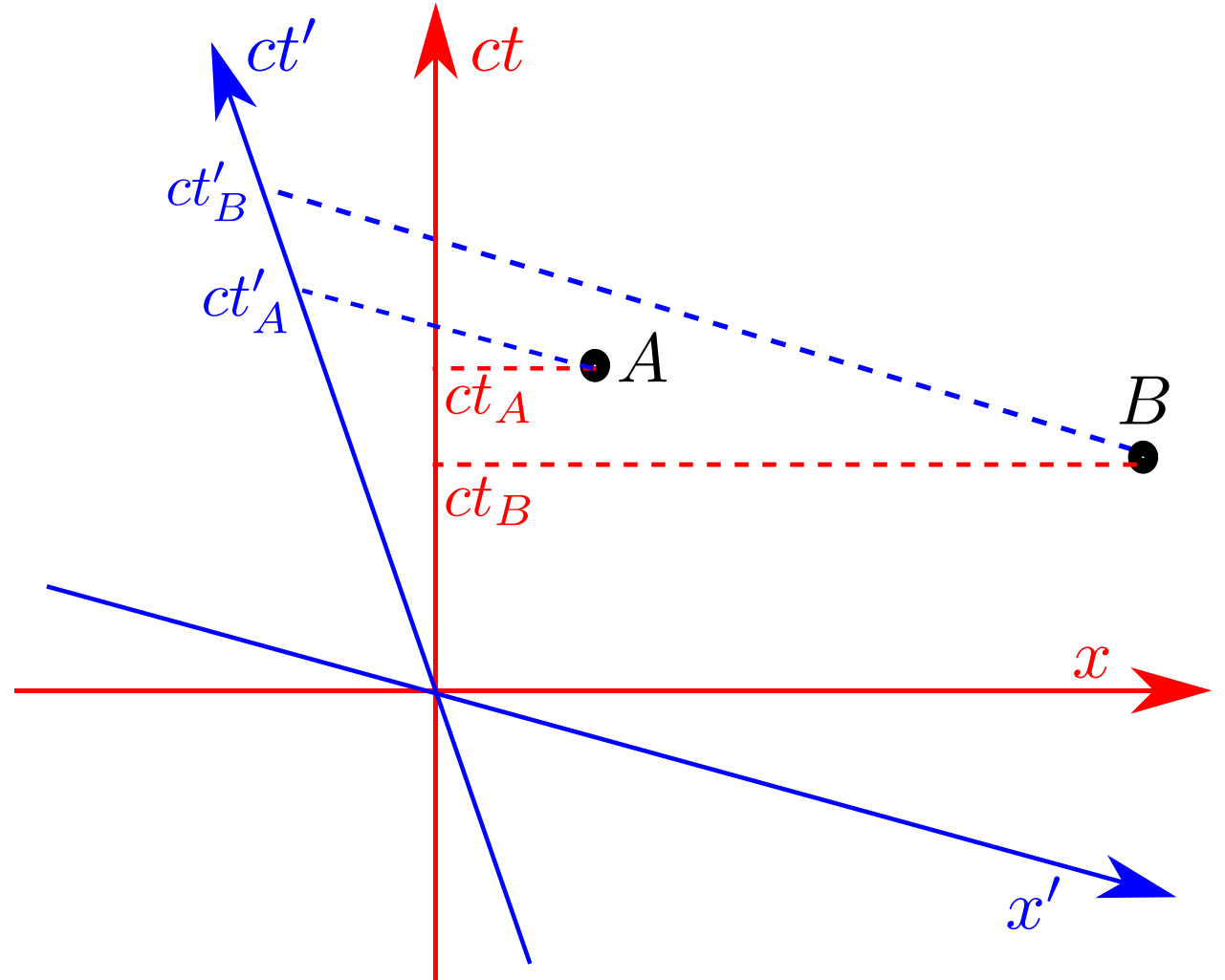
Causally independent events A and B measured by two observers.

Observers disagree on order of events:

Unprimed observer: $t_A > t_B$

Primed observer: $t'_A < t'_B$

Order of causally independent events cannot be decided objectively.



Special Relativity primer: *Light cones*

Light cone of event E is the same for all observers

D depends on E , and E depends on C .

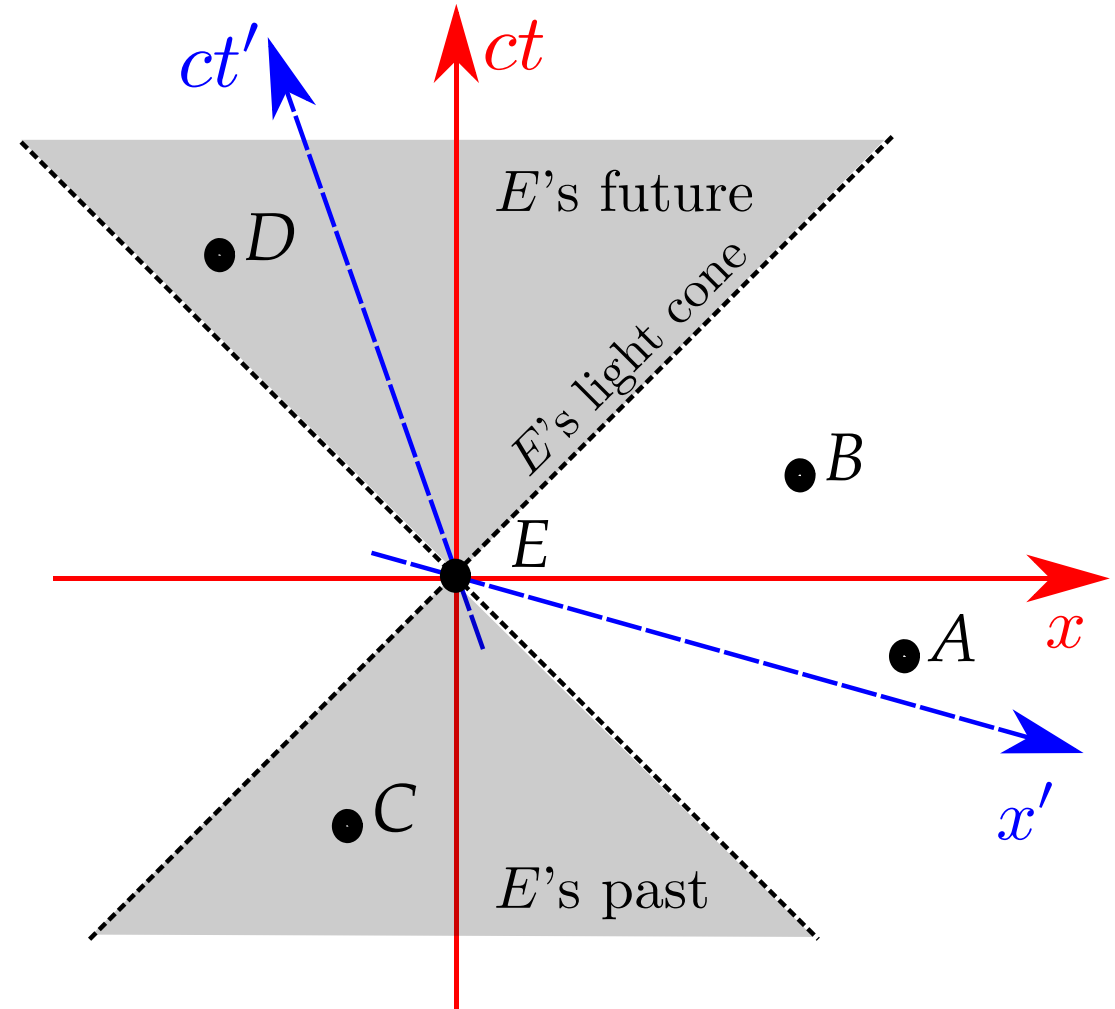
A and B are causally independent from E

Notions of:

before, after, and simultaneously

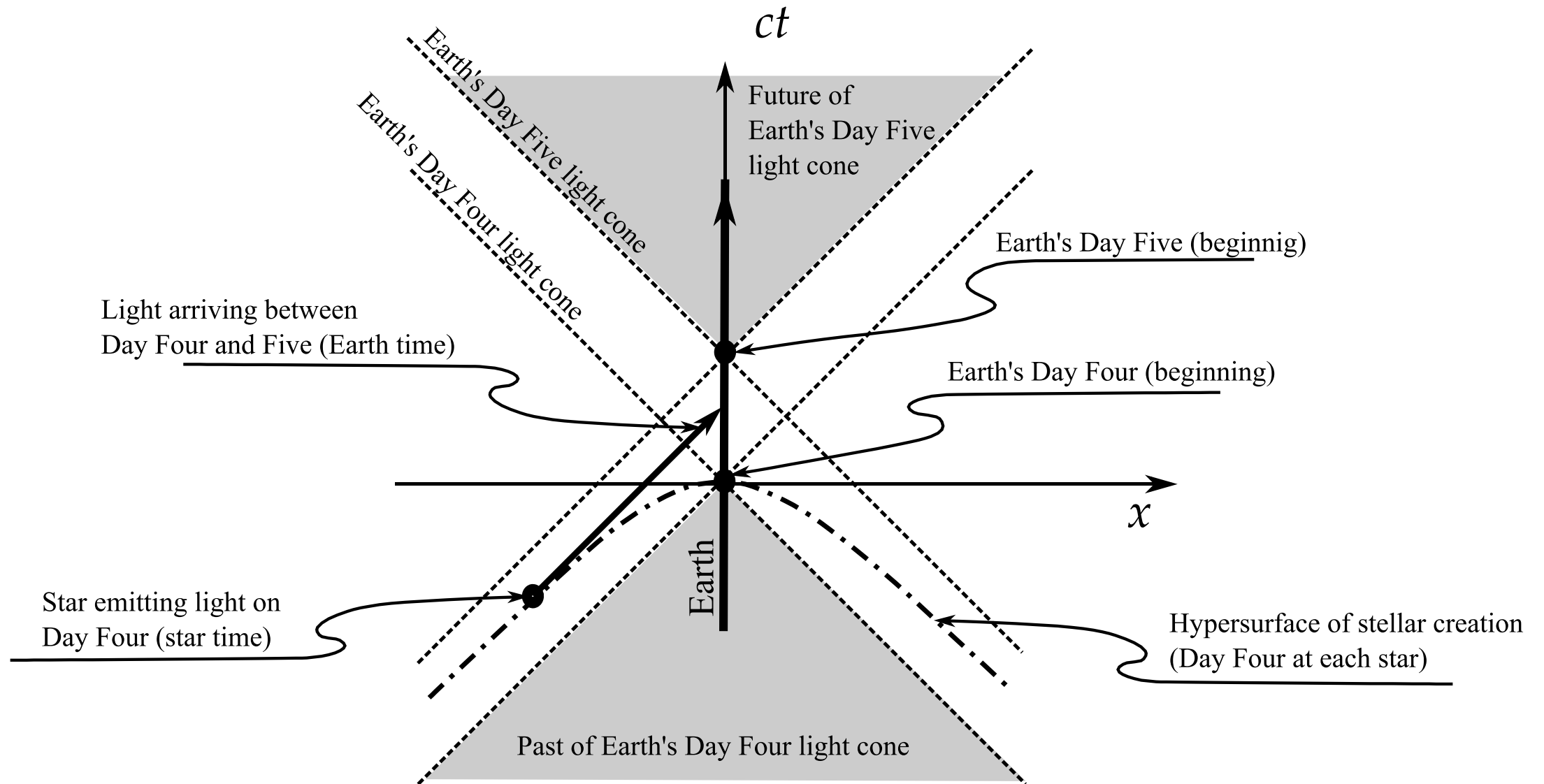
are replaced by:

past, future, and causally independent



Proposed Solution

Proposed solution: Special initial conditions and new synchrony convention



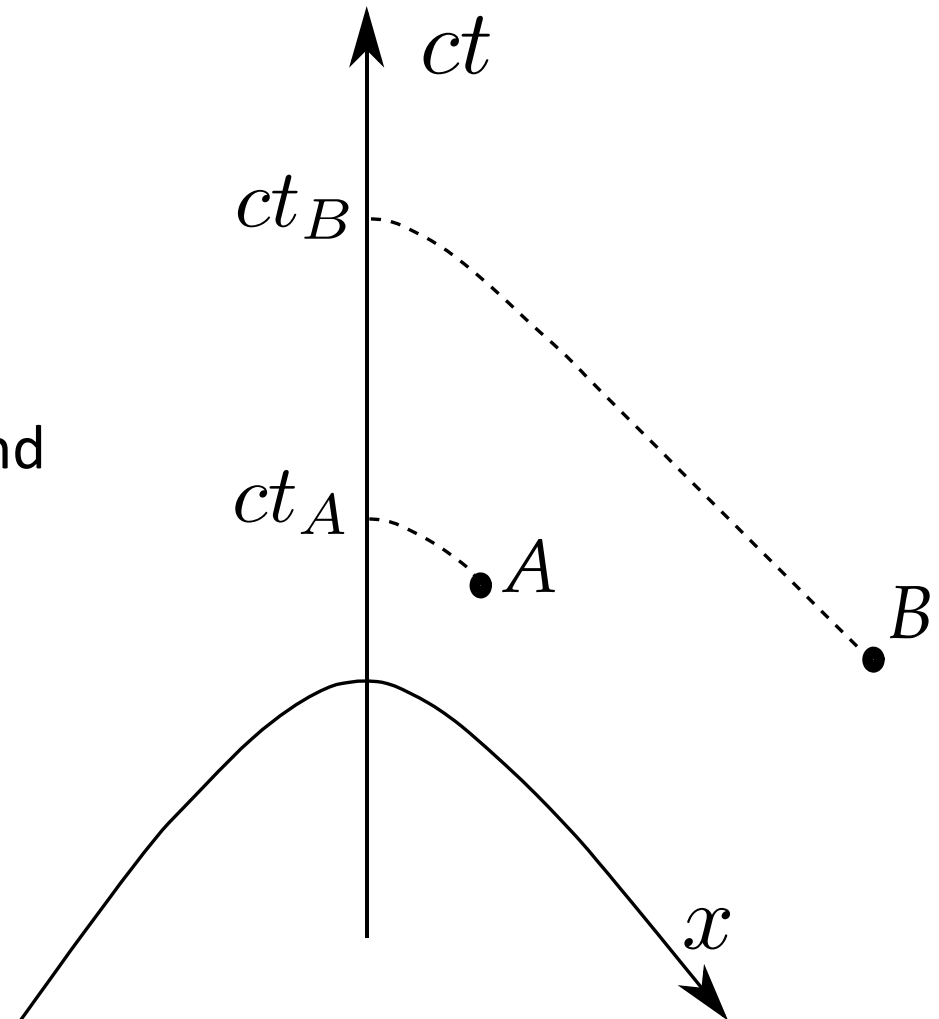
Proposed solution: Special initial conditions and new synchrony convention (2)

- Special initial conditions for stellar creation events:
 - Outside of the past of Earth's Day Four, but within the past of Earth's Day Five.
 - Ensure that distant starlight arrives at Earth during Earth's Day Four.
 - Causally independent from one another
 - Can be reckoned as simultaneous by the choice of synchrony convention below.
- Divinely prescribed synchrony convention
 - God's numbering of the days in Genesis 1 specifies synchrony for all events in the universe.
 - God reckoned stellar creation events as simultaneous with Earth's Day Four.
- By God's synchrony convention, Earth was created before the stars, and yet because of the initial conditions, starlight arrived to Earth on Day Four.

Our solution is consistent with both Scripture and Special Relativity.

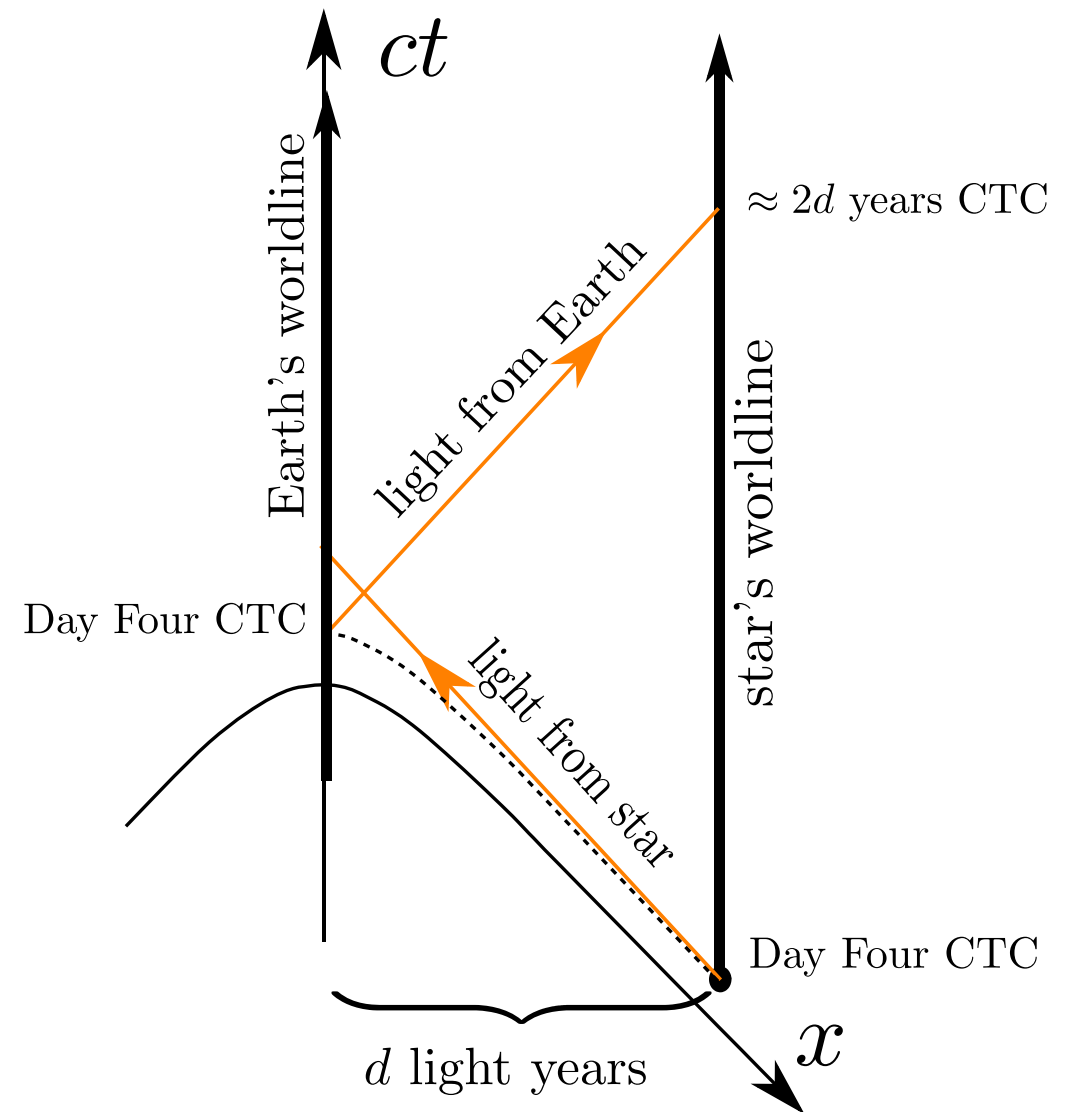
Creation Time Coordinates (CTCs)

- CTC = local time since Creation.
- Analogous to “cosmological time” (local time since the Big Bang.)
- Two events are reckoned as synchronous if and only if they have the same CTCs.
- Prescribes observer-independent (absolute) ordering of events in the universe.



Anisotropy of the initial conditions and Earth's special location

- Starlight emitted on Day Four CTC arrives at Earth within Day Four CTC.
- Earth's light emitted on Day Four CTC still has not reached distant stars.
- Stars causally affect Earth; not vice versa.
- Consistent with Scripture:
 - Stars are for signs and seasons (Gen. 1:14)
 - Man is to rule over everything in sea, land and air (Gen. 1:28), and not the stars.



Testable Prediction: The Visible Cosmos is Young

- Biblical Evidence
- Observational evidence from nearby objects: Paucity of supernova remnants.
- Observational evidence from distant objects

Evidence for young cosmos: *Biblical evidence*

“... in six days the Lord made heaven and earth, the sea, and all that is in them, ...”
(Exodus 20:11)

The straightforward meaning is that “six days” applies to all of Creation.

Evidence for young cosmos: *Paucity of supernova remnants (SNRs)*

- First pointed out by Davies (1994). Remains valid today, with minor corrections.
- SNR is the expanding cloud-like structure from a supernova (SN) explosion.
- Each SNR should be observable for at least 120,000 years.

$$\frac{120,000 \text{ years of observability}}{25 \text{ years between SN events}} \times (\text{observability factor}) = \# \text{ expected SNRs}$$

Evidence for young cosmos: *Paucity of supernova remnants (SNRs) (2)*

Reference	Obs. factor	Expected	Actual	Exp./Act.
<i>Milky Way</i>				
Davies 1994	0.47	2,256	205	9.1
Green 2014	0.67	3,216	294	9.1
<i>Large Magellanic Cloud (160K light years away; 10% mass of Milky Way)</i>				
Davies 1994	0.59	281	29	9.7
Seok 2013; Badenes 2010	0.95	456	47	9.7
<i>Small Magellanic Cloud (200K light years away; 7% mass of Milky Way)</i>				
Badenes 2010	0.95	319	23	13.9
<i>M33 (2.7M light years away; 10% mass of Milky way)</i>				
Long 2010	0.90	432	100	4.3

The paucity of SNRs suggests only thousands not billions of years of history.

Evidence for young Cosmos: *Evidence in the distant cosmos (Lisle 2010)*

- Presence of blue Type O main sequence stars in distant galaxies.
 - Extremely hot, bright, and quick burning with life spans in the millions (not billions) of years..
 - No credible naturalistic explanation of their formation.
 - Observed in the Milky Way and in distant galaxies as far as technology allows.
- Galaxies in the Hubble ultra-deep field images have similar structure and appear equally mature as nearby galaxies.

Comparison with prior ideas

Creation Time Coordinates (CTC) solution in relation to:

- Conventional old-age cosmologies
- Humphreys' Cosmology
- Lisle's ASC model

Comparison with prior ideas: *Conventional old-age cosmologies*

The proposed solution:

- Is consistent with well established scientific theories, such as Special Relativity
- Invokes no new physics, ad hoc miracles, variable speed of light, or time-dilation.
- Applies Special Relativity with specific initial conditions.

Differences with conventional old-age cosmologies. Our solution:

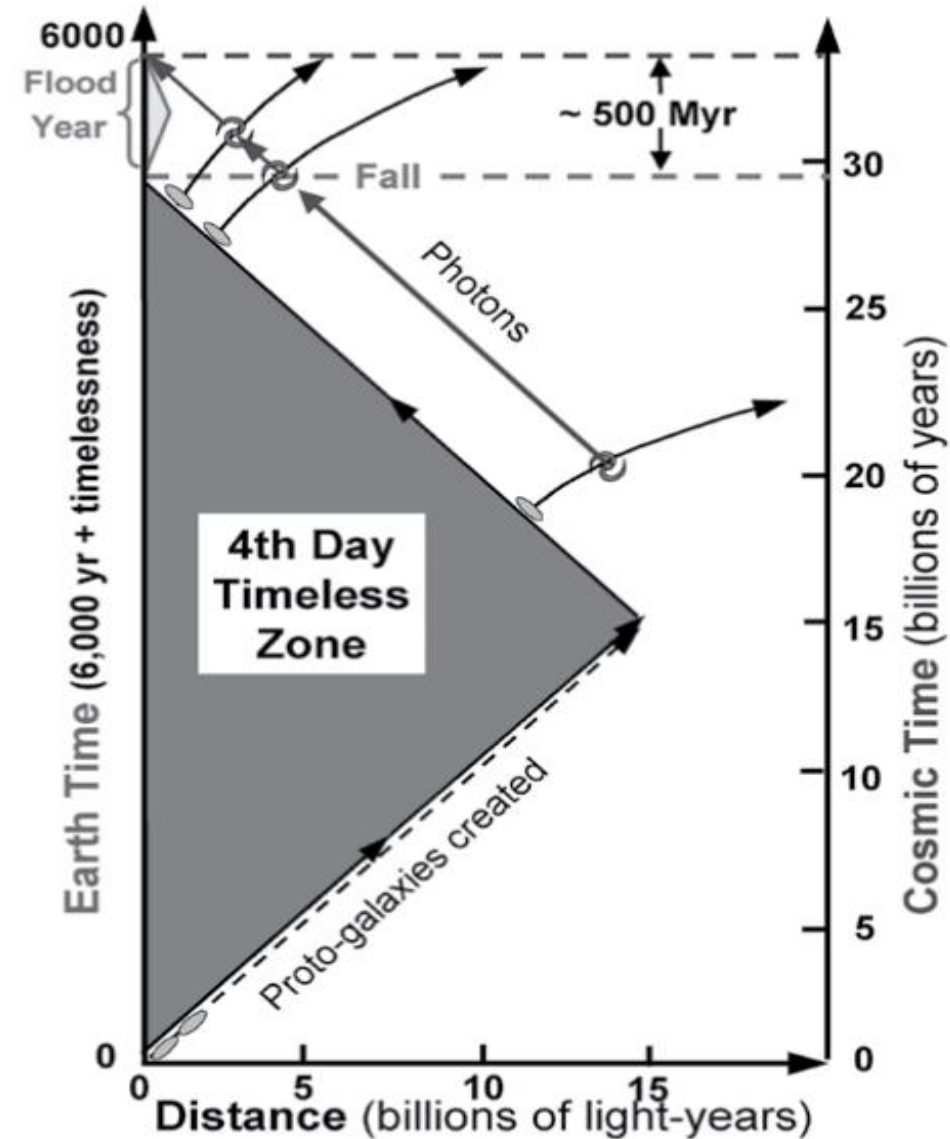
- Excludes the Cosmological Principle*
- Predicts that stars are just a few thousand years old.

* The Cosmological Principle is the cornerstone assumption of modern cosmology, which states that there is no special place in the universe. It is an atheistic presupposition about lack of design. Humphreys (1994) had stressed the need for its repudiation; cosmologists today admit that it is an unprovable assumption.

Comparison with prior ideas: *Humphreys' (2008, 2017) Cosmology*

- Humphreys' cosmology:
 1. A timeliness zone engulfs Earth on Day Four, which expands outwardly and then contracts inwardly, so:
 2. "First starlight" events are arranged along Earth's Day Four past light cone. This solves the Starlight Problem.
 3. A subsequent timelessness event ensures that distant galaxies have had time to age.
- The proposed solution accomplishes Part #2 directly and without timelessness.

Without Part #3, both solutions yield similar result.



Comparison with prior ideas: *Lisle's (2010) ASC model*

- Lisle's solution:
 1. Specifies an observer-dependent synchrony convention: the Anisotropic Synchrony Convention (ASC).
 2. Applies the ASC to an observer on Earth, thus possibly implying the initial conditions where:
"First starlight" events are arranged along Earth's Day Four past light cone.
- Proposed new solution
 1. Specifies a new observer-independent synchrony convention based on Creation Time Coordinates (CTCs), which is motivated by God's numbering of the creation days.
 2. Clearly states the requisite initial conditions according to which
"First starlight" events are arranged along Earth's Day Four past light cone.

Our solution is similar to Lisle's, but clearly specifies the required initial conditions, and uses a new observer-independent synchrony convention.

Responses to Potential Objections

Objection: *Does our solution simply define the problem away?*

- Our solution calls for special initial conditions and a new synchrony convention.
- The special initial conditions allow starlight to reach Earth on Day Four. They are:
 - Physical and not merely a matter of definition.
 - Independent of the synchrony convention.
- The synchrony convention defines absolute order of causally-independent events.
 - According to Special Relativity (SR), ordering of causally-independent events (e.g., distant star creation events) is ambiguous.
 - SR leaves open the choice of synchrony convention for such events.
 - Genesis 1 prescribes a synchrony convention (the CTC) which is consistent with SR.
 - Using the CTC convention ensures that our solution is consistent with Genesis 1.

Objection: *Doesn't asymmetric light speed imply that space is anisotropic?*

- Where does this objection come from?
 - Light leaves a distant star on Day Four according to the star's Creation Time Coordinate (CTC) and arrives at Earth on Day Four according to the Earth's CTC.
 - Based on departure and arrival times, it appears that light travels infinitely fast towards Earth. For the reverse direction, one calculates light speed to be $c/2$.
- Consider an analogy:
 - A plane leaves Beijing at 1pm and arrives in New York at 1pm on the same day.
 - Based on departure and arrival times, the plane traveled with infinite speed; however, in the reverse direction, the plane appears to have traveled with half of its normal speed.
- The choice of synchrony convention is like the choice of time zones:
 - Arbitrary and has no effect on the physics of space.
 - Necessary nonetheless for communicating the ordering of events.
- Scripture uses CTCs to convey times in Genesis 1.

Objection: *Asymmetry of one-way light speed still bothers me!*

Realize this: ***The one-way speed of light is not a physical quantity!***

The one-way speed of light is not a physical quantity because it cannot be measured without some prior assumption about the one-way speed of light.

Any references to the speed of light c in physics formulae refers to a measurable physical quantity, which is the round-trip speed of light.

Other (perhaps less common) objections discussed in the paper

- Isn't the CTC synchrony convention awkward?
- Are the CTC physically realizable coordinates?
- Does the existence of a special reference frame, as suggested by the CTC convention, conflict with Special Relativity?
- Humphreys' (2017) argument that Scripture points to old cosmos

We invite the audience to raise any further questions during the Q & A session.

Summary and Conclusion

- Solution consisting of **special initial conditions** and a **new synchrony convention**.
 - Initial conditions prescribe specific arrangements of stellar creation events.
 - The synchrony convention is based on God's number of creation days in Genesis 1.
- Introduces Creation Time Coordinate (CTC) as the elapsed time since Creation.
- Predicts youthful looking cosmos, which is supported by observations.
- Rejects the Cosmological Principle.
- Resembles Lisle's ASC model, but with clearer initial conditions and better motivated synchrony convention.
- Is the convergence of prior research.

Q & A

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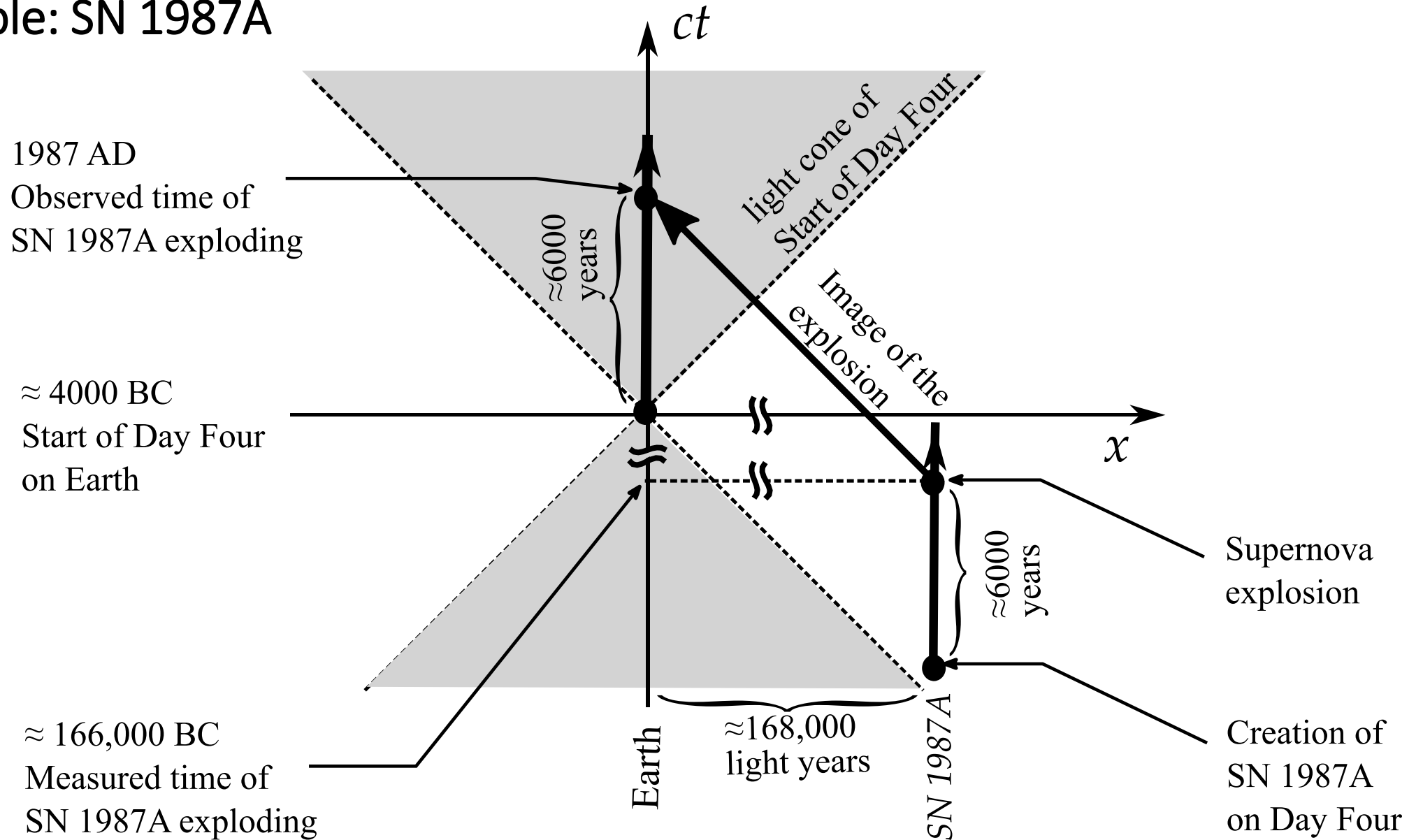
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Backup Slides

Example: SN 1987A

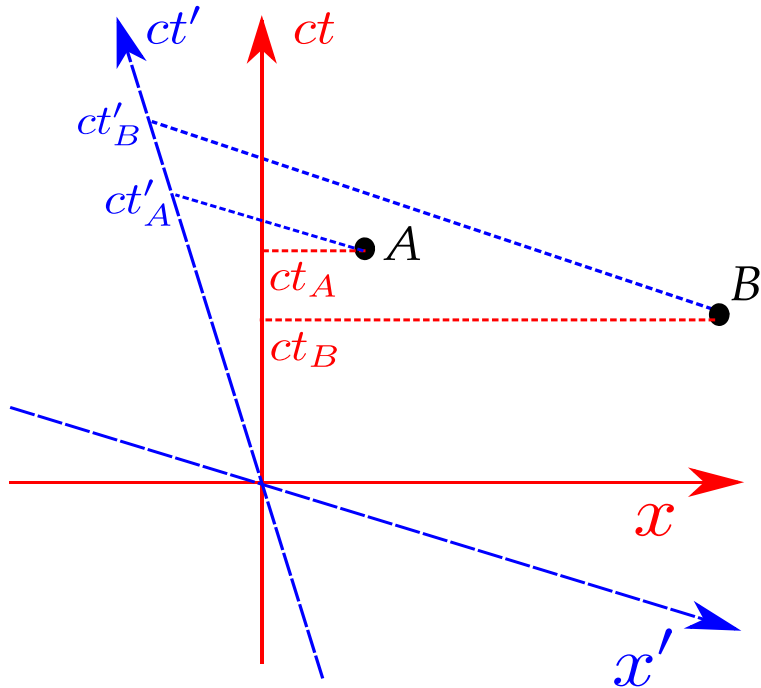


Special Relativity primer: *Synchrony conventions*

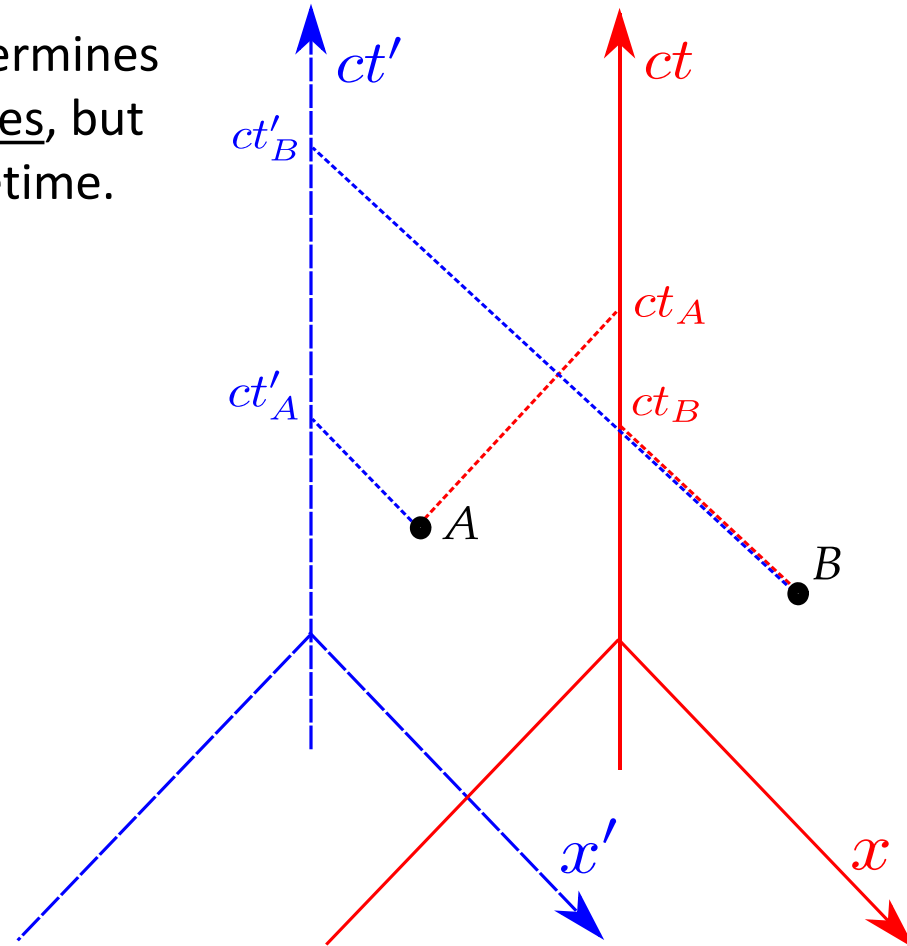
- Synchrony (simultaneity of events) **is not** an objective notion but is by convention.
- Choice of synchrony determines the one-way speed of light, and vice versa.
For example:
 - The Einstein Synchrony Convention (ESC) fixes the one-way speed of light to be isotropic.
 - The Anisotropic Synchrony Convention (ASC) reckons events along the edge of a light cone as simultaneous.
- Choice of synchrony has no physical significance at all.
- **Choice of synchrony convention alone** does not solve the Starlight Problem

Special Relativity primer: *Synchrony conventions example: ESC vs. ASC*

The synchrony convention determines the orientation of the space axes, but does not affect events in spacetime.

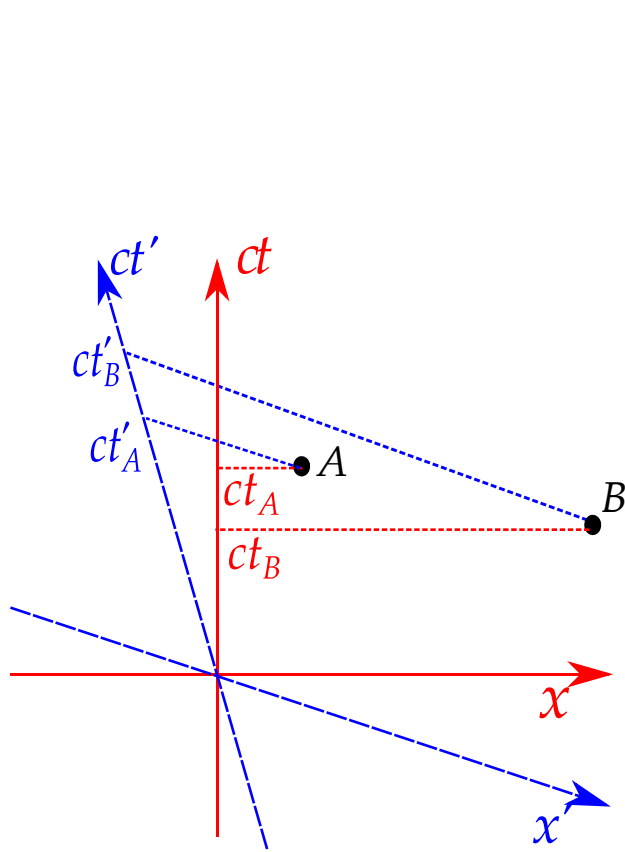


Einstein Synchrony Convention (ESC)
depends on the observer's motion

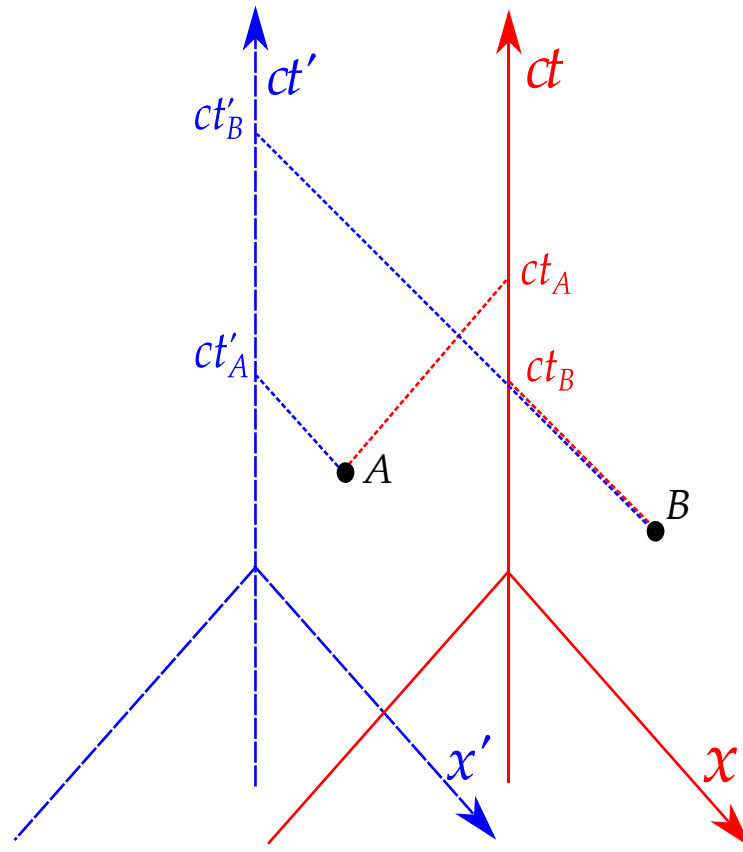


Anisotropic Synchrony Convention (ASC)
depends on the observer's location

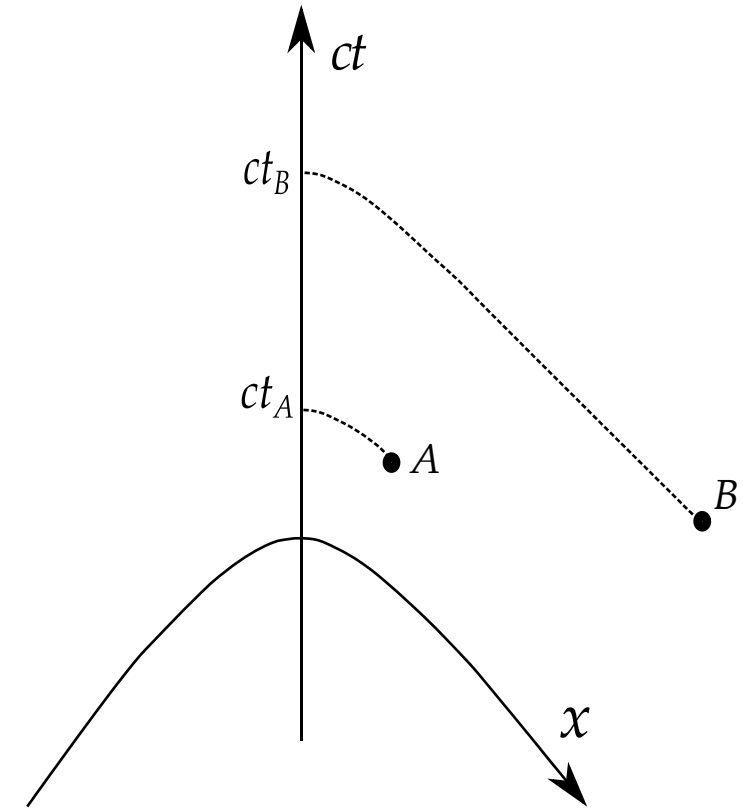
Comparison of synchrony conventions for independent events A and B



ESC



ASC



CTC