Branching continuations with observers

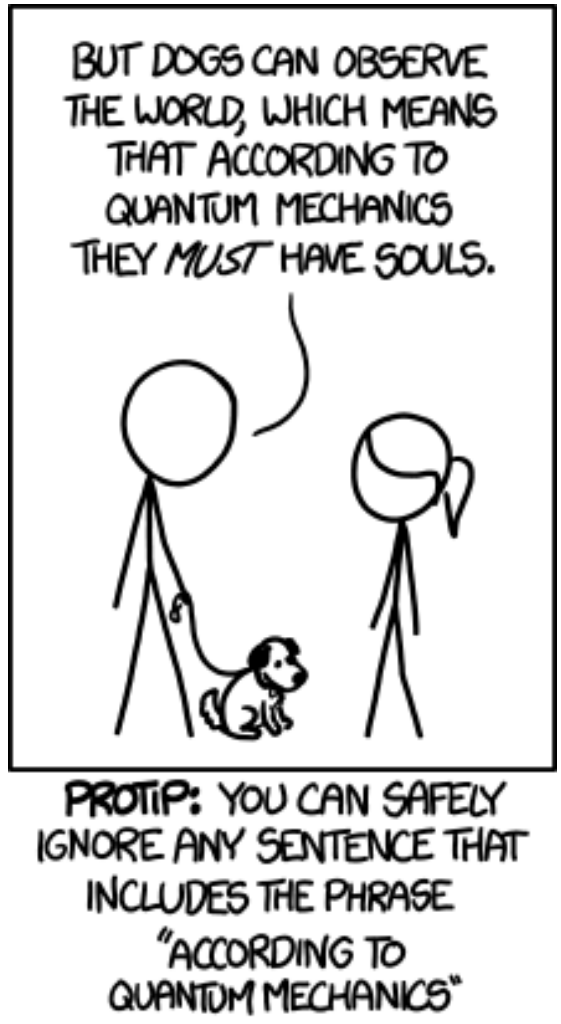
Petr Švarný

Logic, Relativity and Beyond, 2015

Outline

GOAL

- Observers in quantum and relativistic context.



http://xkcd.com/1240/

OBSERVERS

1. local 'passive' measurements
2. local 'active' measurements

A. Einstein: Relativity: The Special and General Theory W. Heisenberg: Physics and philosophy

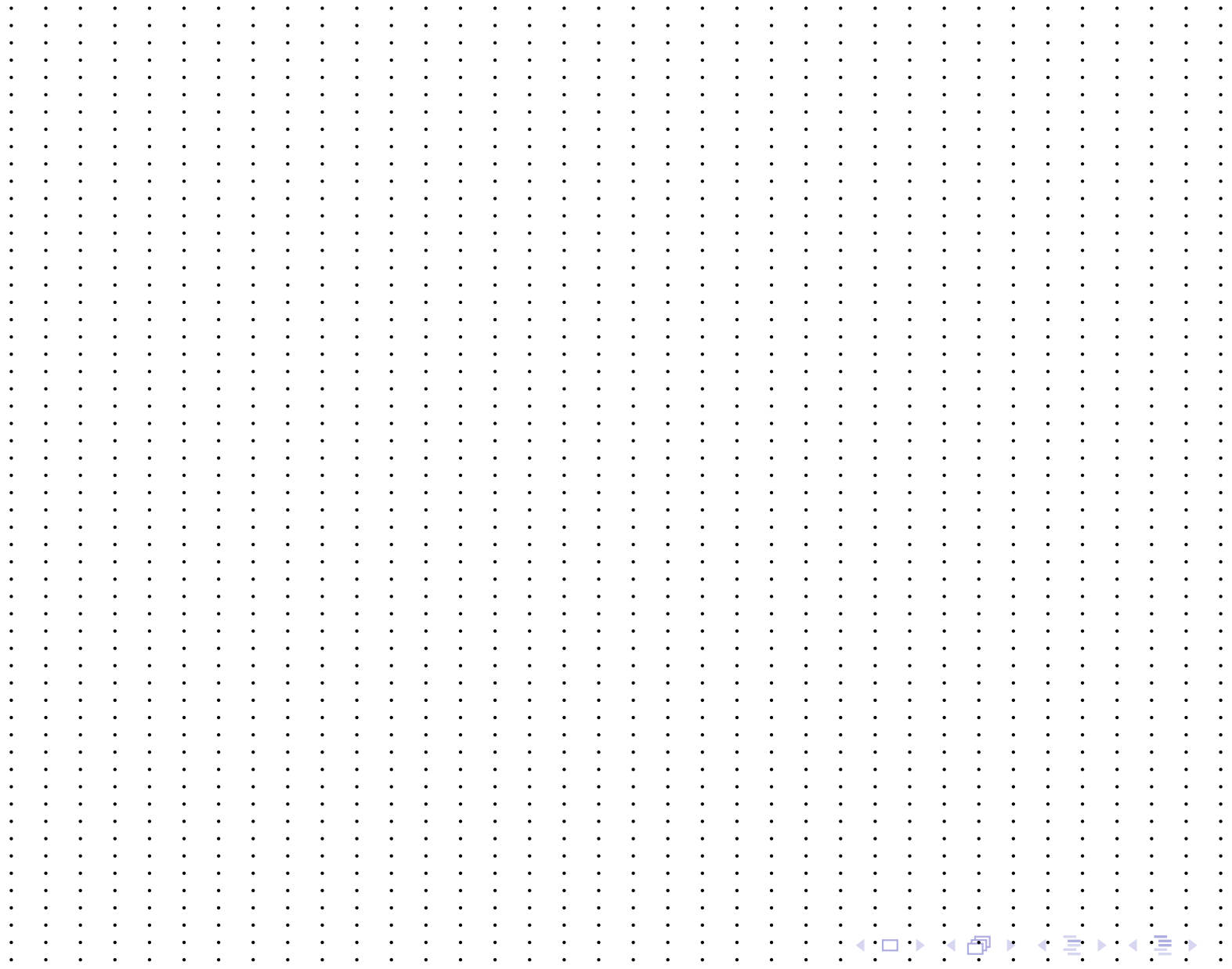
OBSERVERS

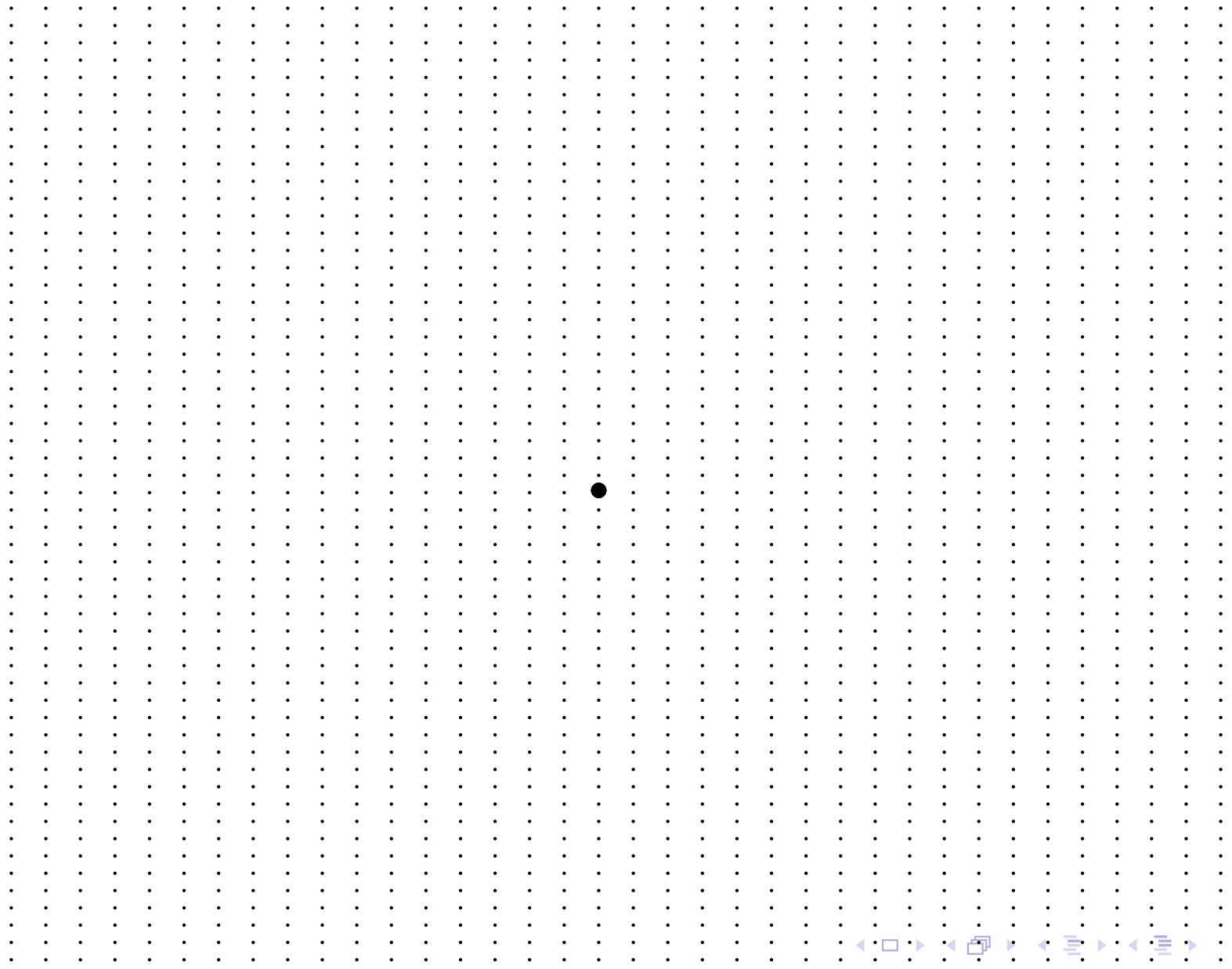
- local collection of measuring devices

- H. Andréka, J. X. Madarász, I. Németi, G. Székely: Axiomatizing relativistic dynamics without conservation postulates, 2008

- $(W, \leq)$
- Continuations, I-events
- $e_C, e/A$
- BCont + gFoT

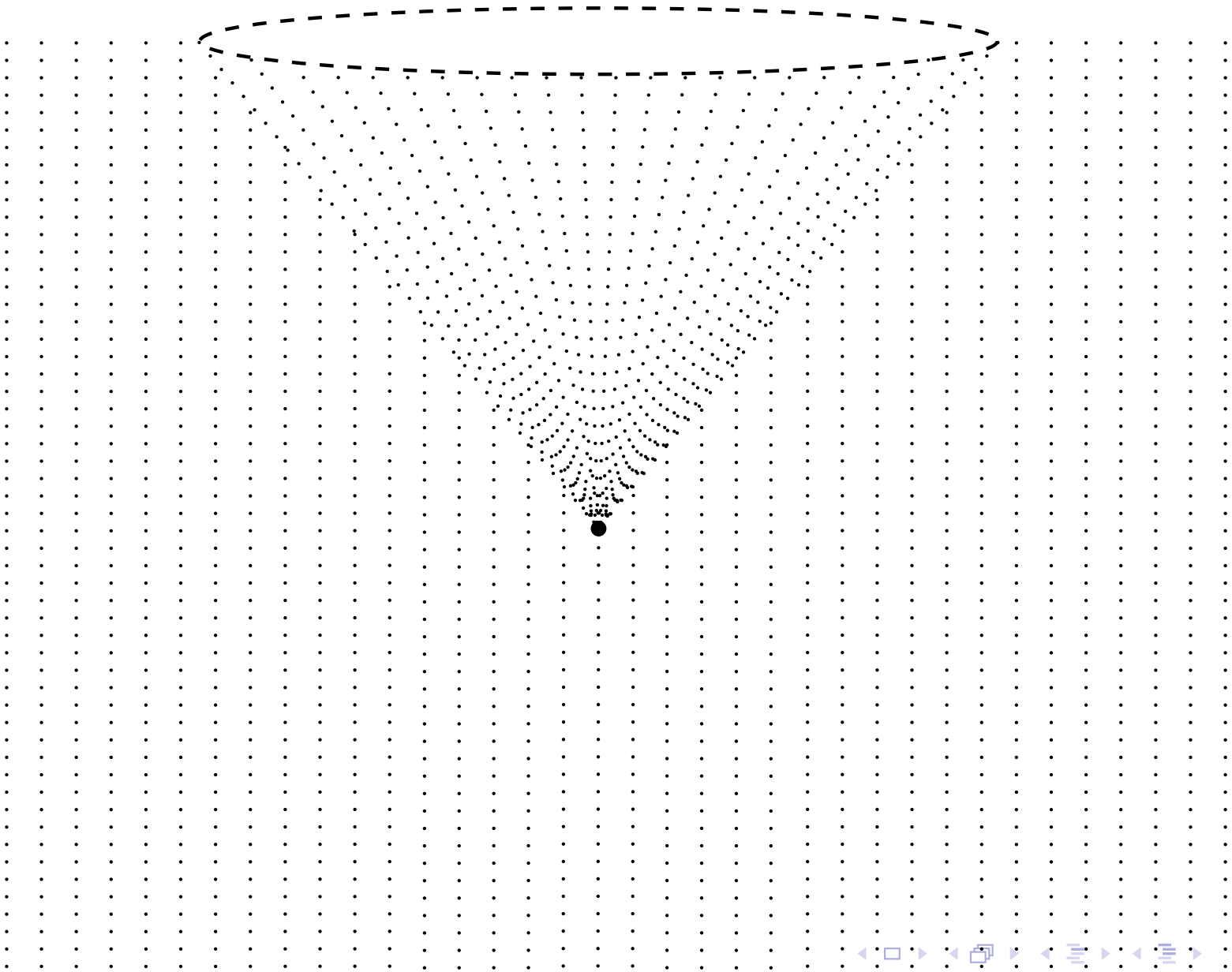
T. Placek: Possibilities Without Possible Worlds/Histories, 2009
P. Švarný: Flow of Time in BST/BCont Models and Related Semantical Observations, 2012

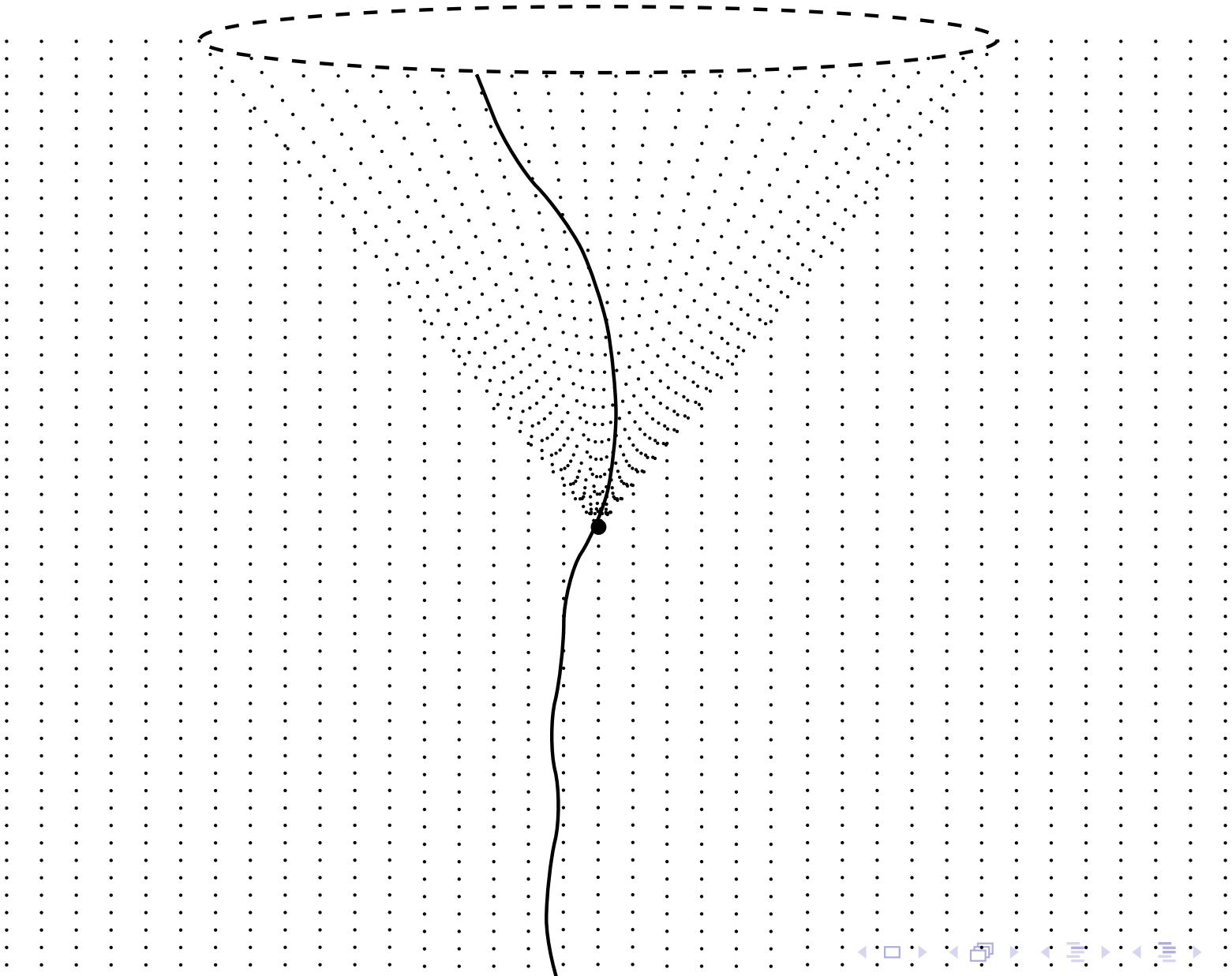


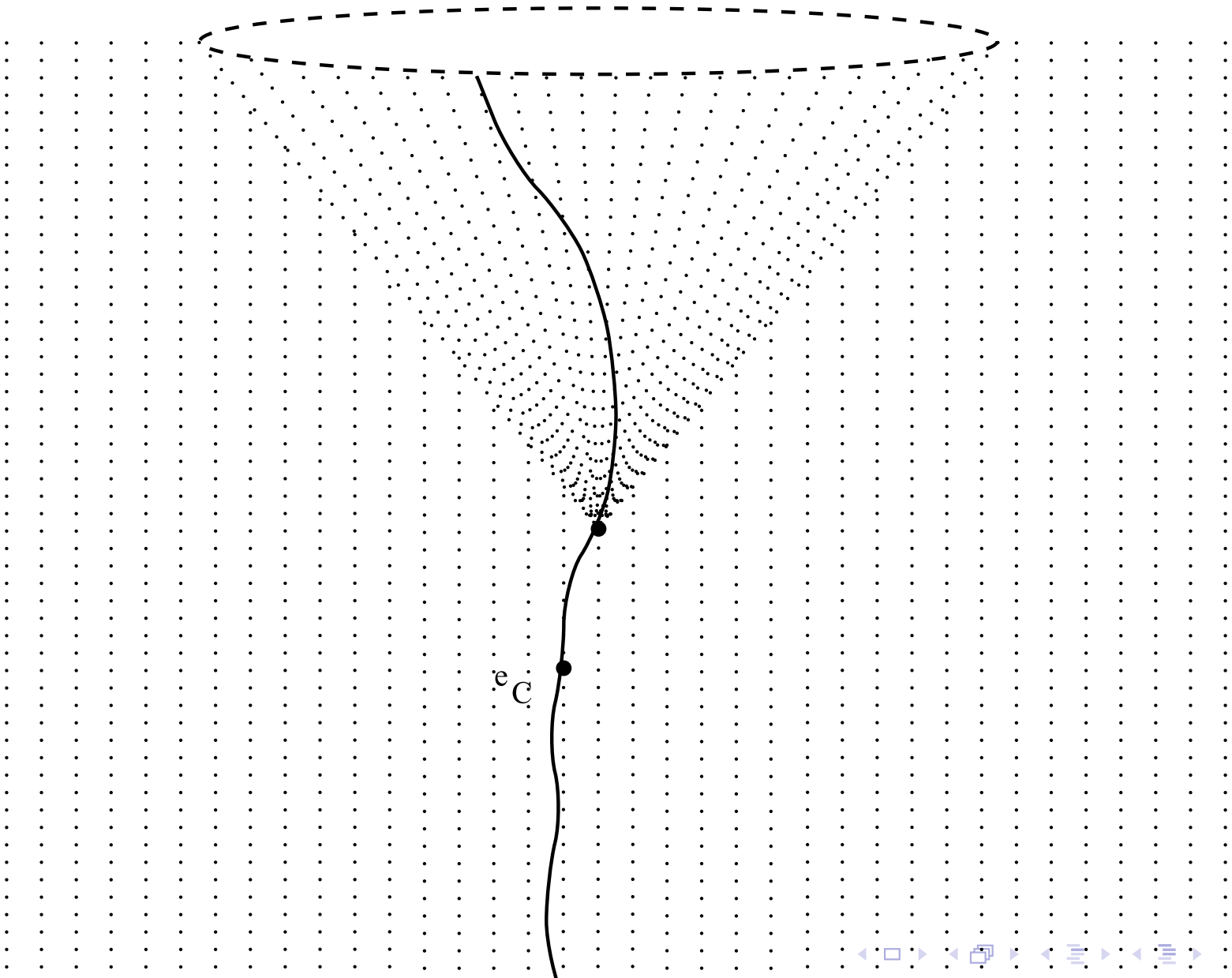


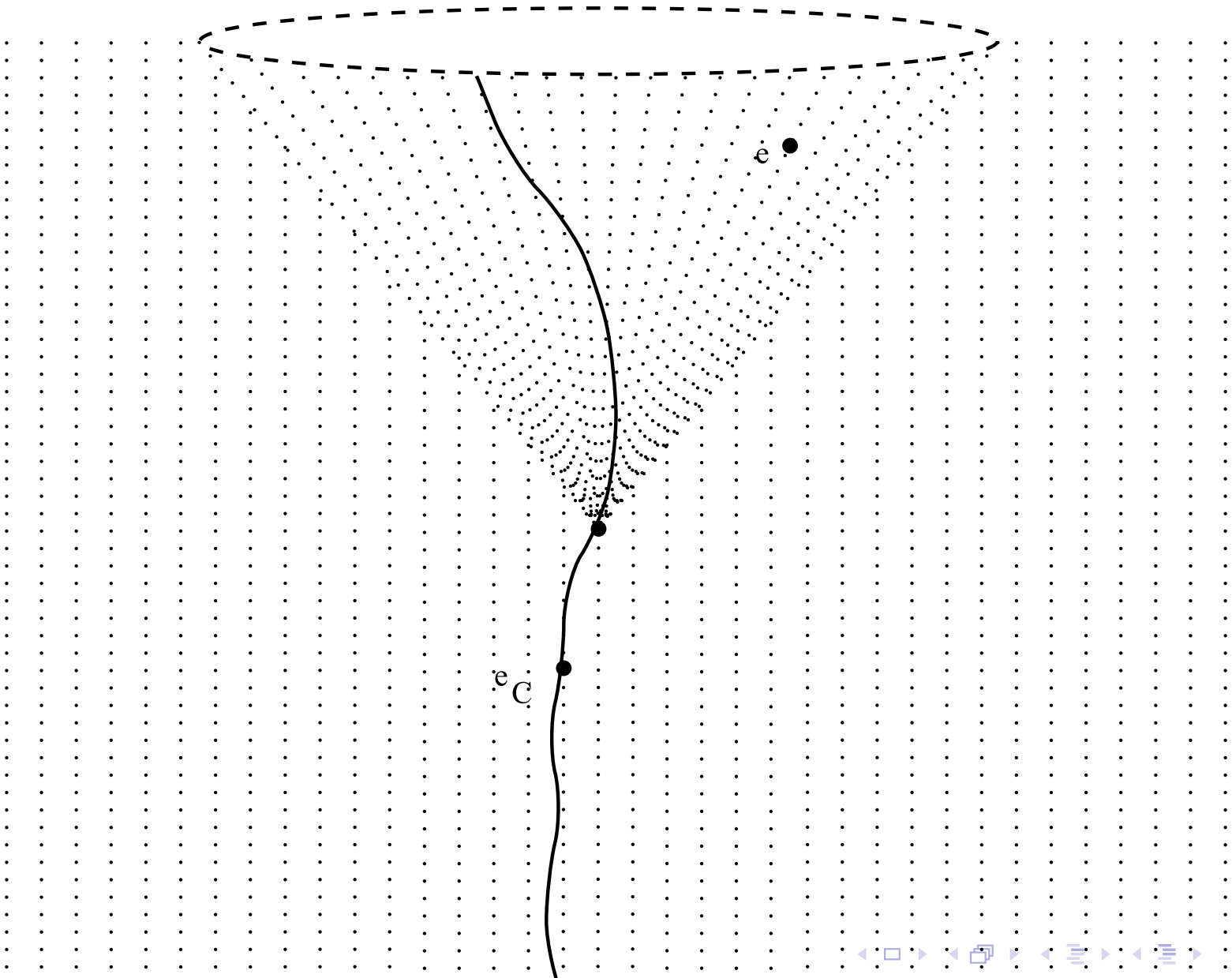
BCONT BASICS

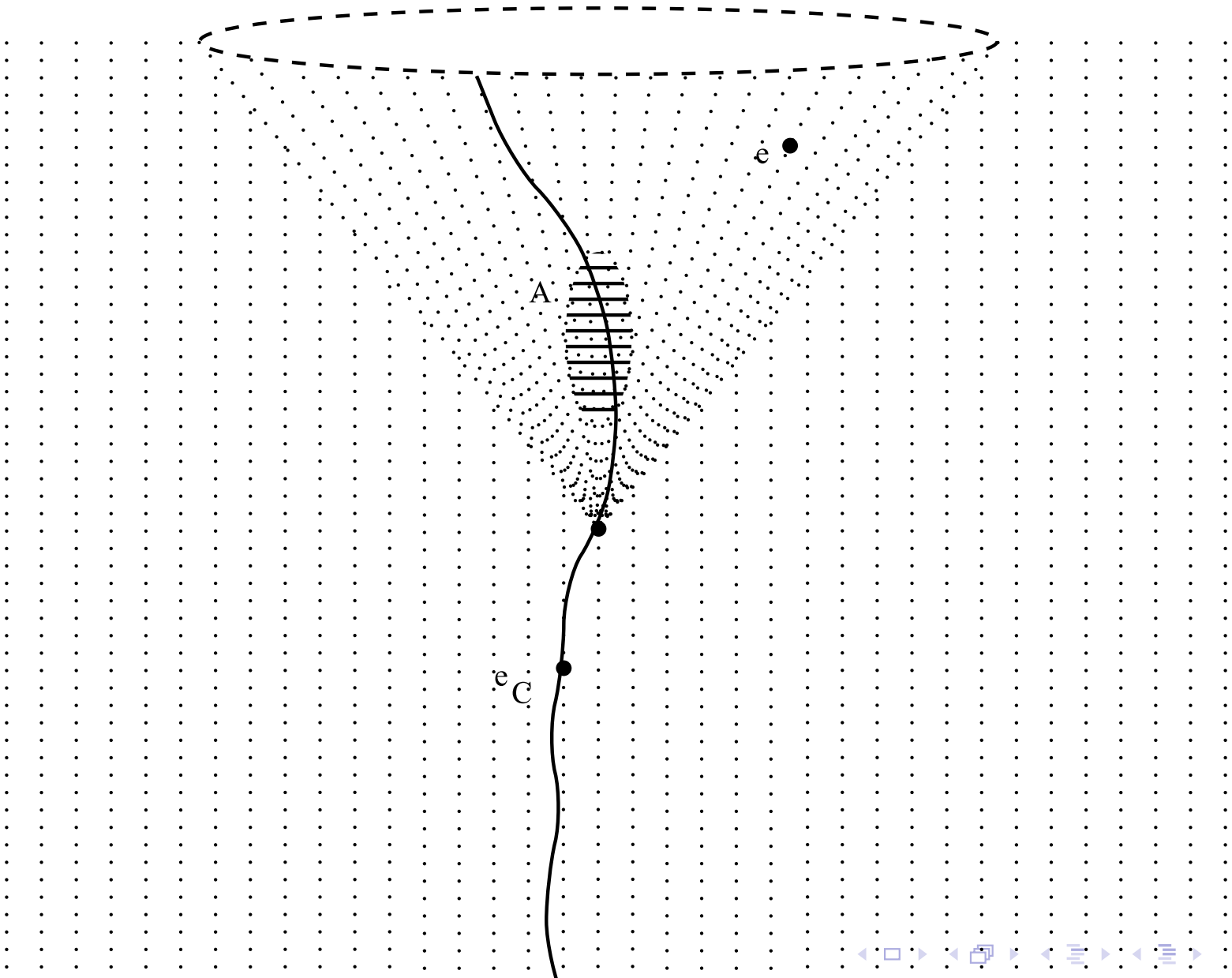
Possible continuations

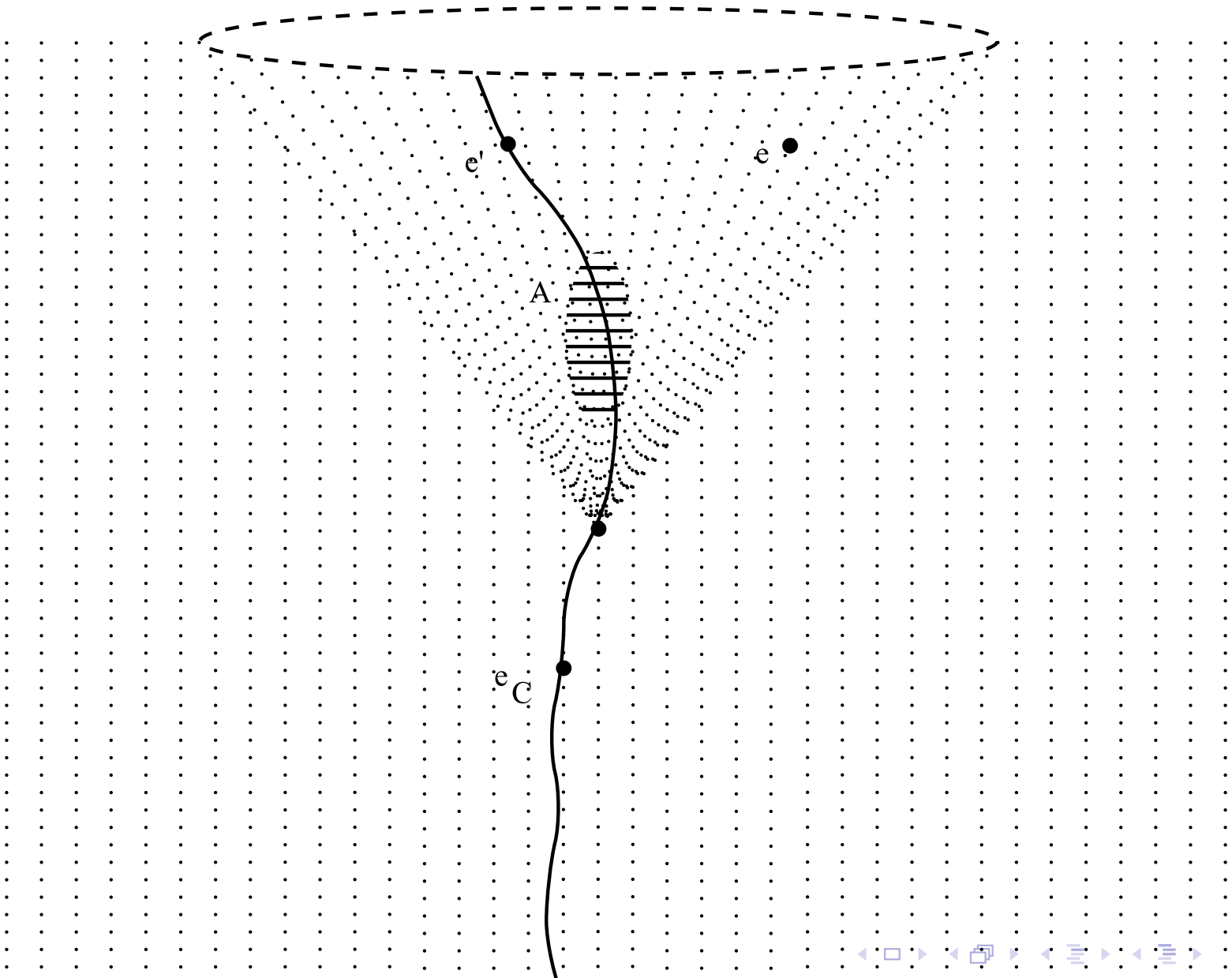





e
C


e
e
C


e
A
e
C


e'
e
A
e
C

Is there a difference between necessary future events and future events?

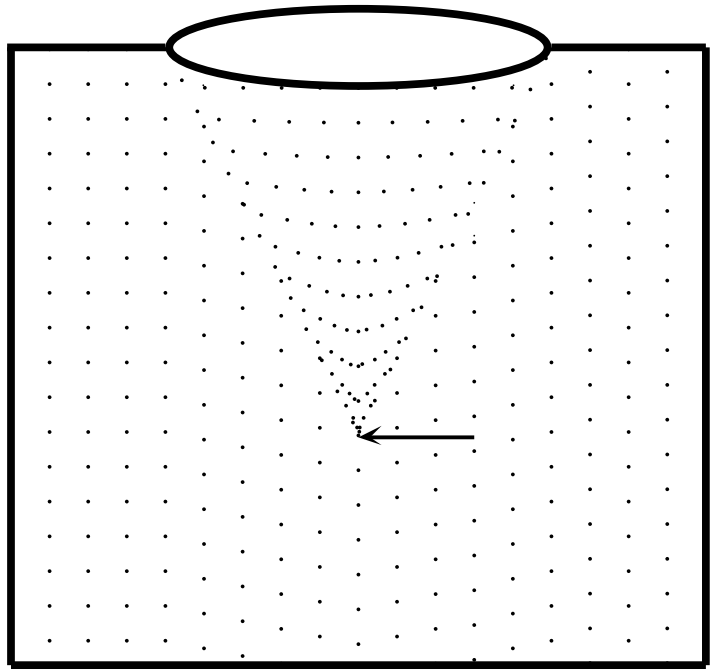
$$\mathfrak{M}, e_C, e_C/A, X_{Wl_{(e_C)},A} \models F_1\psi$$

vs

$$\mathfrak{M}, e_C, e_C/A, X_{Wl_{(e_C)},A} \models \mathit{Sett} : F_1\psi$$

SETTLEDNESS OF THE FUTURE I

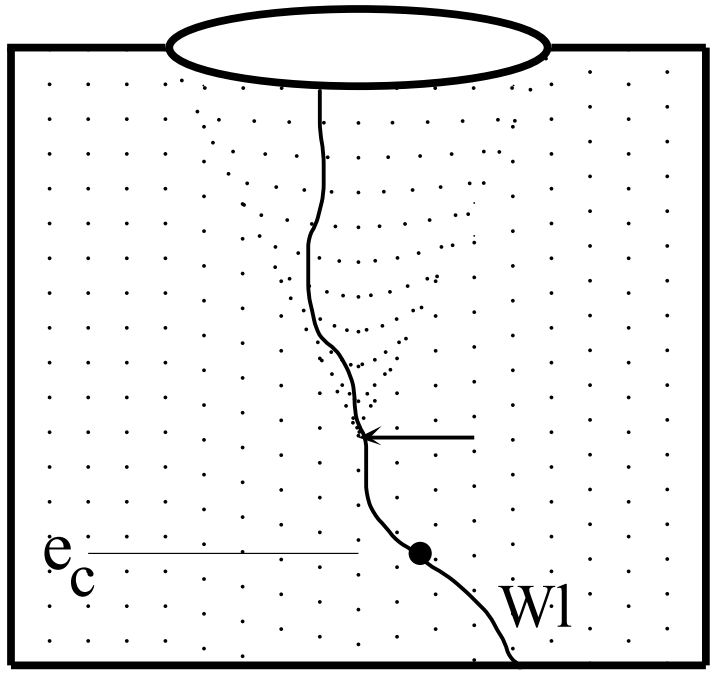
Choice event in BCont+FoT



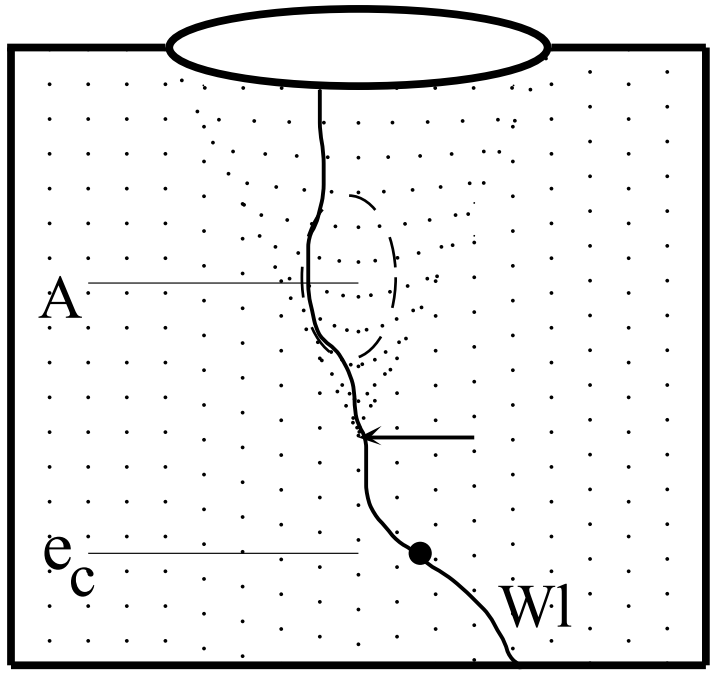
A 2D BCont model with a CE.

SETTLEDNESS OF THE FUTURE II

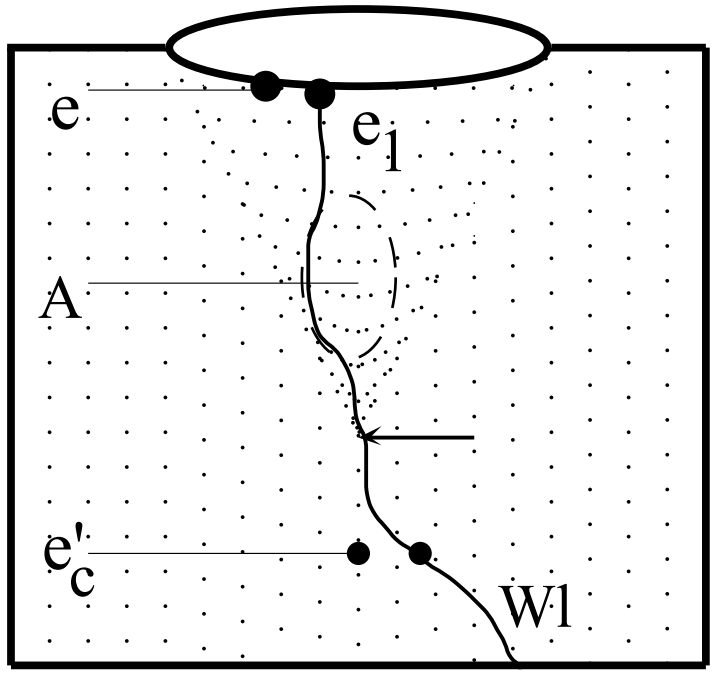
Time-like curves



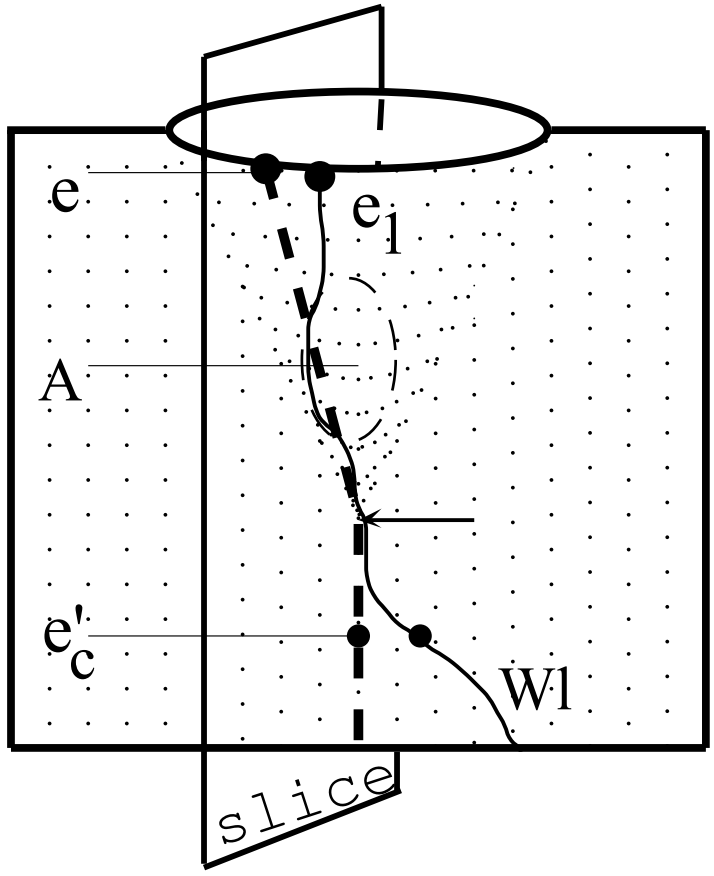
Model with a t-l curve and moment of use.



Adding the continuation *A*.

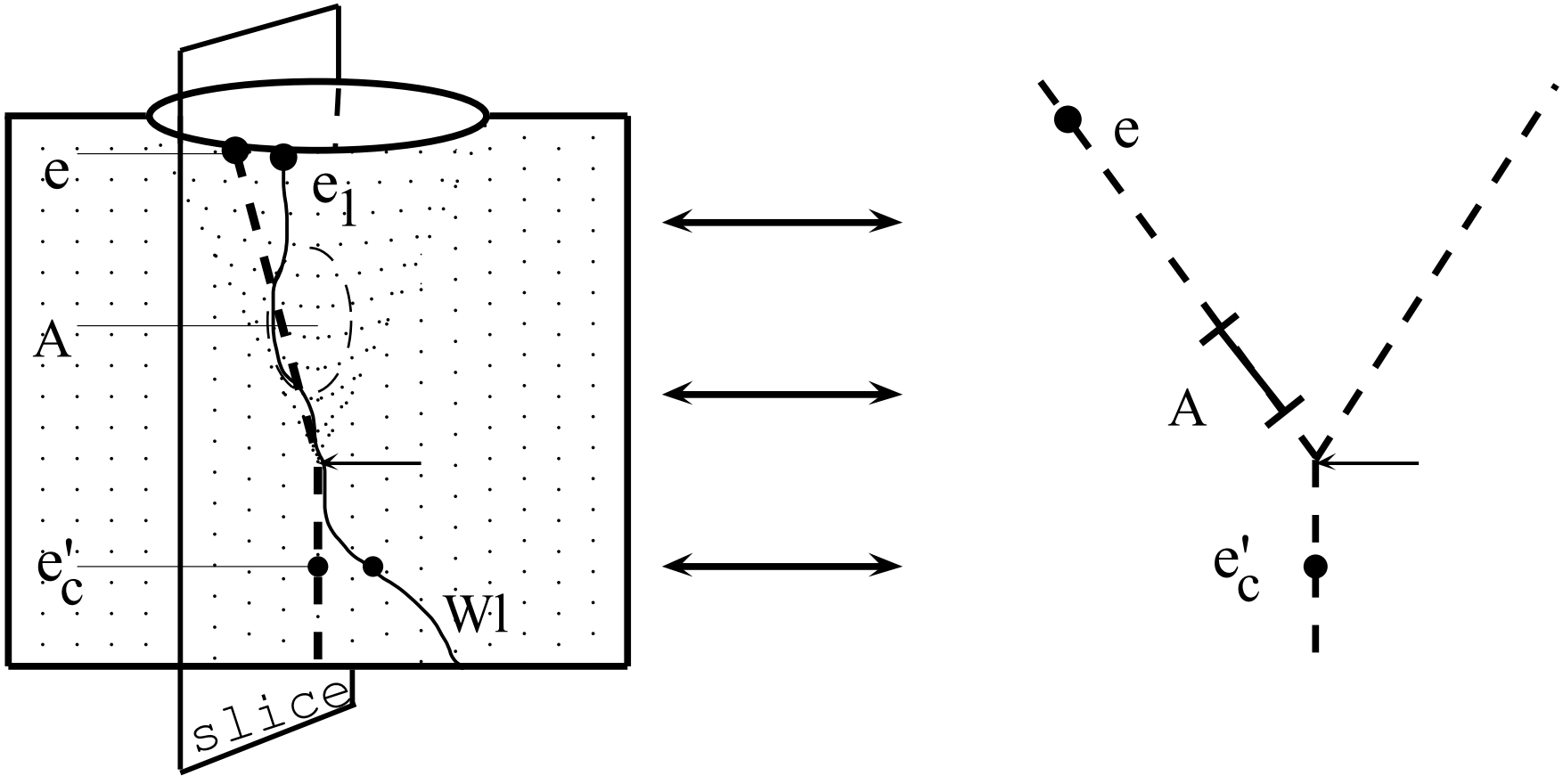


Adding the reference point e_1 and the point e that belongs to e_1's setting of now-points and where ψ holds.



Preparing a slice going through point *e*.

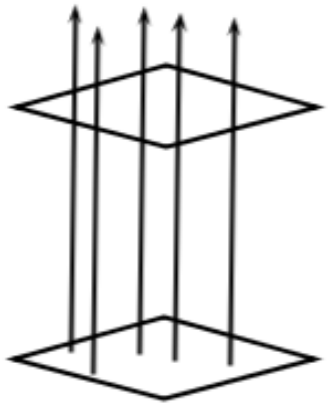
SETTLEDNESS OF THE FUTURE VI



Sett : $F_1\psi \not\equiv F_1\psi$.

OBSERVER

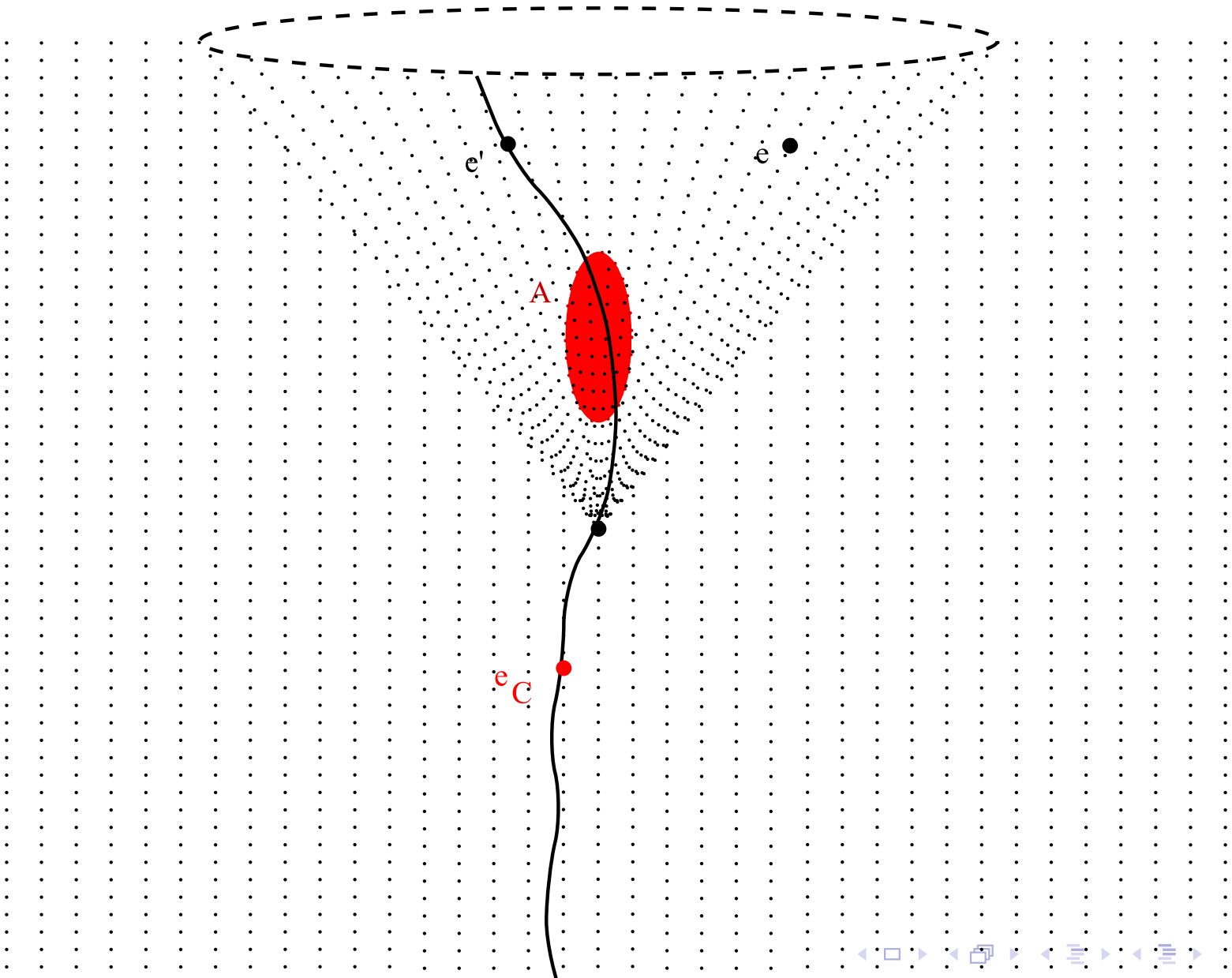
Time-like world-lines

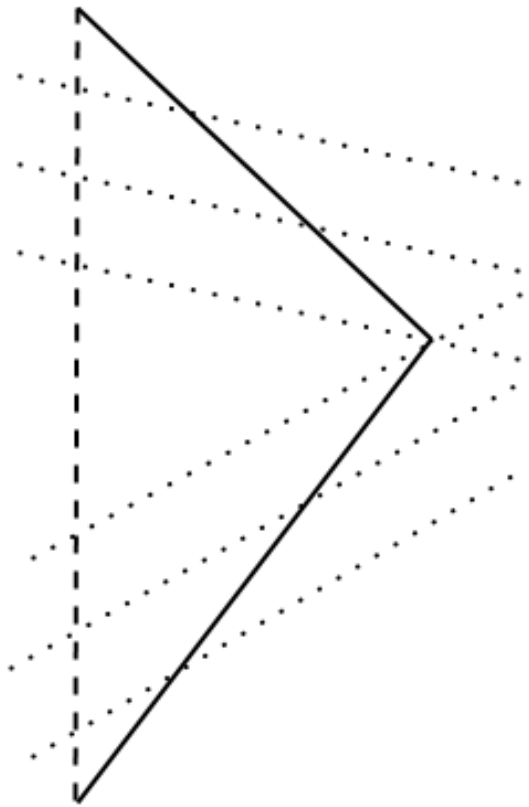


F. De Felice, C. Clarke: Relativity on curved manifolds, 1990

OBSERVER

New I-events





T. Müller, N. Belnap, and K. Kishida: Funny business in branching space-times: Infinite modal correlations, 2008
T. Placek & L. Wroński: On infinite epr-like correlations, 2009

SUMMARY

- BCont accomodates observers

Thank you for your attention.

Thank you for the organization.

FF UK internal grant 2015.

1. $\mathcal{W}$ is a non-empty partially ordered set;
2. the ordering $\leq$ is dense on W;
3. W has no maximal elements;
4. every lower bounded chain $C \subseteq W$ has an infimum;
5. if a chain $C \subseteq W$ is upper bounded and $C \leq b$ then there is a unique minimum in $\{e \in W | C \leq e \wedge e \leq b\}$;
6. for every $x, y, e \in W$, if $e \not\leq x$ and $e \not\leq y$ then x and y are snake-linked in the subset $W_{\not\geq e} := \{e' \in W | e \not\leq e'\}$ of W;
7. if $x, y \in W$ and $W_{\leq xy} := \{e \in W | e \leq x \wedge e \leq y\} \neq \emptyset$ then $W_{\leq xy}$ has a maximal element;
8. for every $x_1, x_2 \in W$, if $\forall c : c \in CE \rightarrow c \not\leq x_i$ then x_1, x_2 are snake-linked in the subset $W_{\not\geq CE} := \{e \in W | \forall c \in CE e \not\geq c\}$ of W.