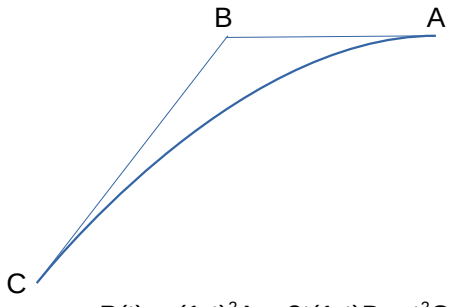
Motion Blur

Motion blur needs:

A time $t_0 \ldots t_1$ range for a frame
A **random** time t in that range for each path
    initial eye ray
    and all rays extending from that
A time based position $P(t)$
    for any motion-blurred object.



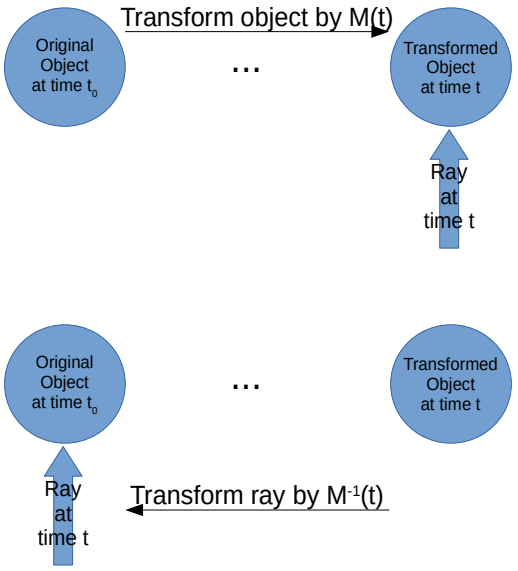
$P(t) = (1-t)^2A + 2t(1-t)B + t^2C$

Time based position of object

Anything goes
    Linear is easy: $P(t) = A + t(B-A)$
    Quadratic is easy: $P(t) = (1-t)^2 A + 2t(1-t)B + t^2 C$
        (that's a quadratic Bezier curve)

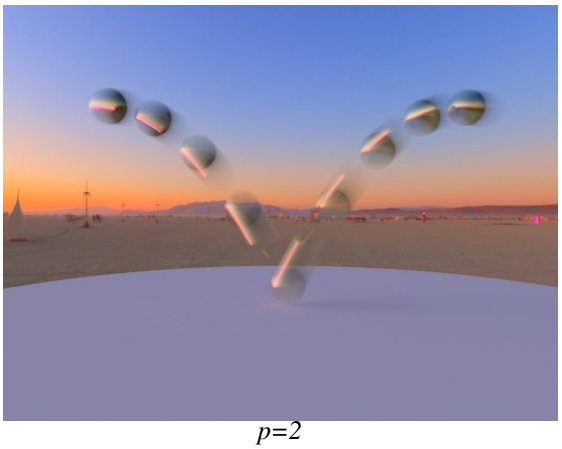
Intersection calculation

For a ray
    with associated path-time t and
    object with time-based position $P(t)$
Do intersection by:
    move ray by $P(0)-P(t)$ and
    intersect with unmoved object

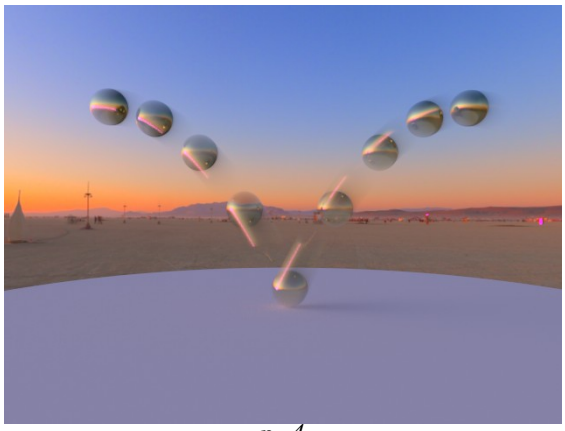


Skewed distribution

To get the solid-head-with-faint-trail effect
Skew $f(t)$ heavily toward the 1 end:
    Replace $P(t)$ with $P(f(t))$
        for $f(t) = 1-(1-t)^p$



p=2



p=4