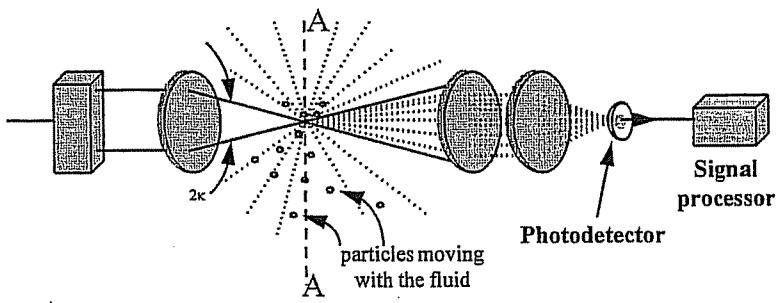
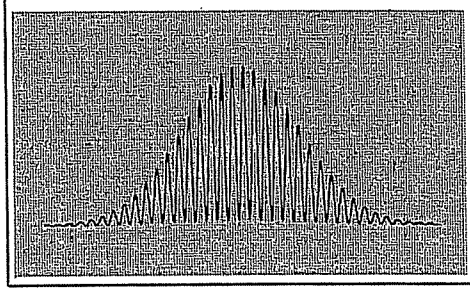
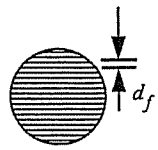
Laser Doppler Velocimetry

Dual beam approach





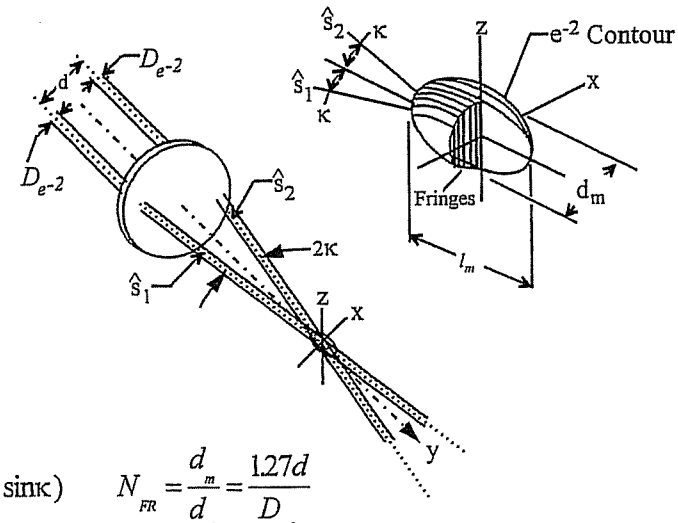


cross sectional
view at A-A

$$d_f = \frac{\lambda}{2\sin\kappa}$$

$$u_x = f_d\, d_f$$

Measurement Volume Dimensions



$$d_{e^{-2}} = 4f\lambda/\pi D_{e^{-2}}$$

$$d_m = d_{e^{-2}}/\cos\kappa$$

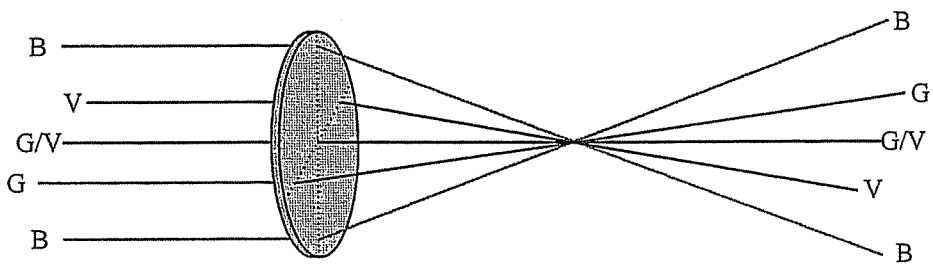
$$l_m = d_{e^{-2}}/\sin\kappa$$

$$V = \pi d_{e^{-2}}^3/(6\cos^2\kappa\sin\kappa)$$

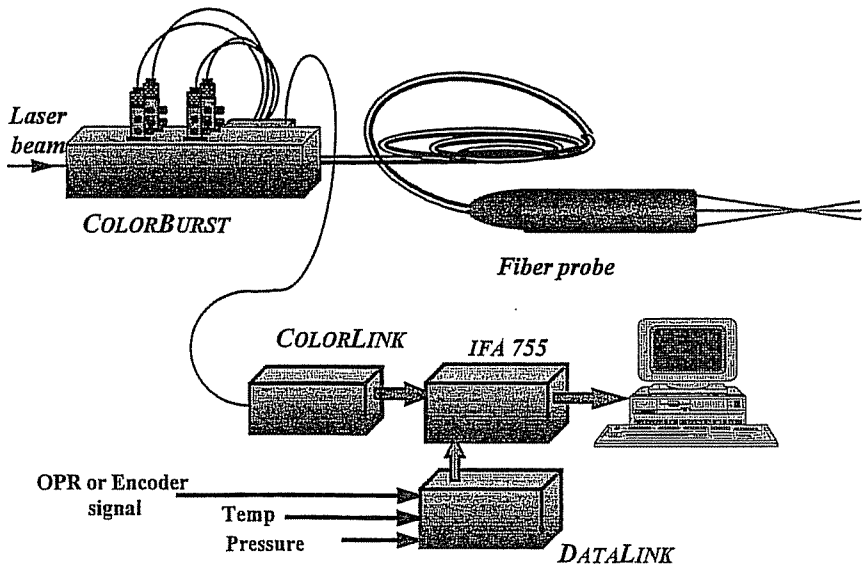
$$N_{FR} = \frac{d_m}{d_f} = \frac{1.27d}{D_{e^{-2}}}$$

3 Component Co-axial probe

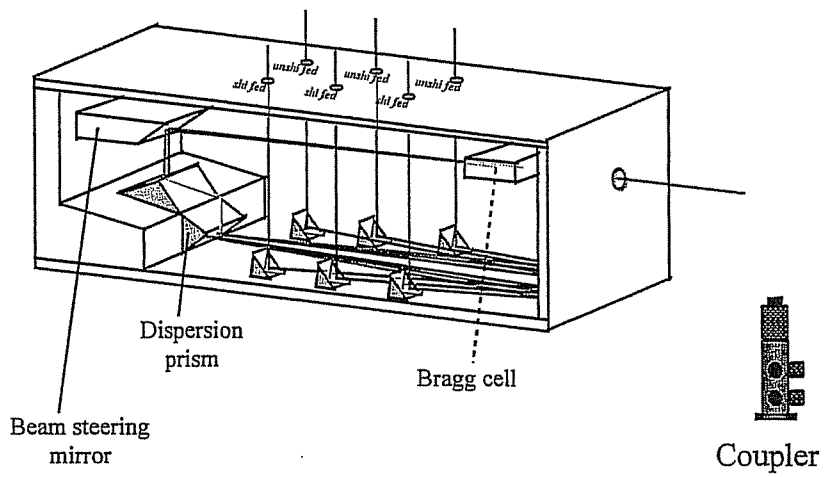
3 Color Arrangement



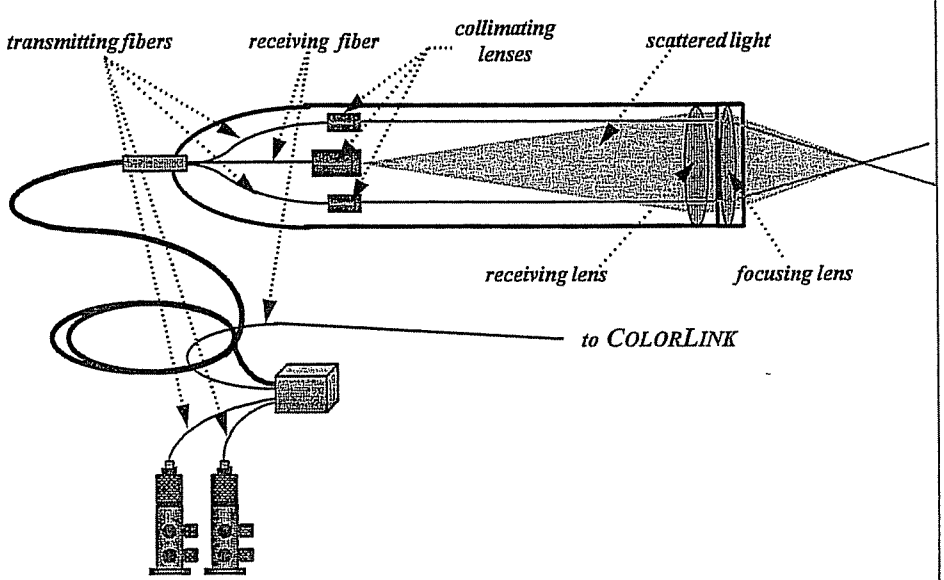
Integrated 2D Fiber Optic LDV System



COLORBURST Multicolor Beam Separator



Fiberoptic Probe

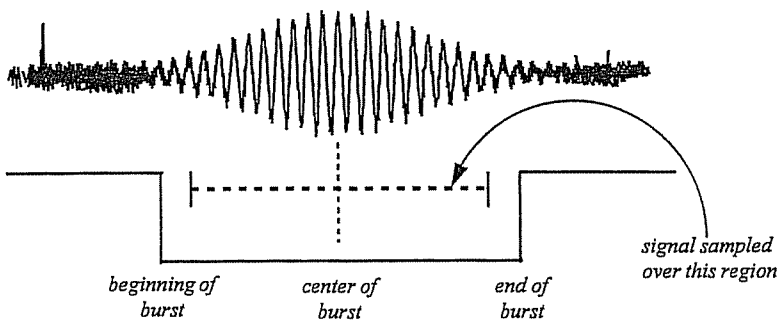


Seed Particles - Air and Water

Particles	Medium	Density (g/cc)	Refractive Index	Dia (μm)
Silicon Carbide	Air/Water	3.2	2.65	1.5
Nylon	Air/Water	1.14	1.53	4.0
PSL	Air	1.05	1.55-1.6	0.5
TiO2	Air/Water	4.2	2.6	3-5
Hollow glass beads (HGB)	Air	1.05-1.15	1.5	8-12
Metal coated HGB	Water	1.65	0.21 (R) 2.62 (I)	14
Peanut oil	Air	0.91	1.47	---

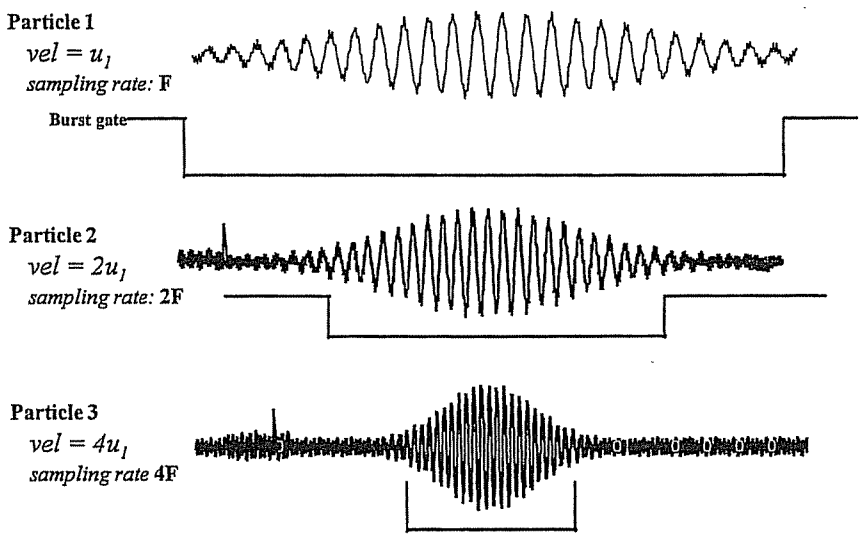
Digital Burst Autocorrelator IFA 755

- IFA 755 or 655 Burst Detector
  - center portion of the signal is sampled at the optimum rate
    - center portion of the signal has the best signal quality
    - burst centering is used to sample the middle portion of the burst
    - collects the large number of samples ***always from all bursts***

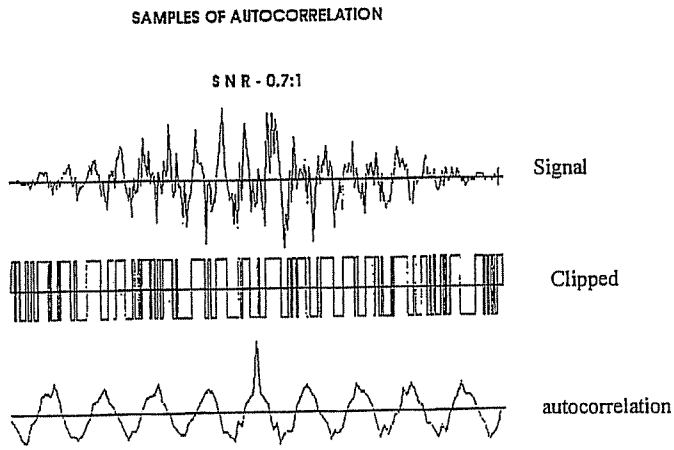


IFA 755

Dynamic sampling rate adjustment



Digital Burst Correlation



A 256 sample autocorrelation perfor[illegible]