



**SNS COLLEGE OF ALLIED HEALTH SCIENCES**

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai



**DEPARTMENT OF CARDIAC TECHNOLOGY**

**PAPER III- BASIC ECG**

**I YEAR**

**UNIT II : LEAD PLACEMENTS**



# LEAD ElectroCardioGram



# 12 LEAD ElectroCardioGram (ECG)



# Aim

To introduce to the student the principles of 12 Lead Electrocardiogram recording and its relationship to the cardiac cycle

12 Lead Machine that gives a 3D perspective.

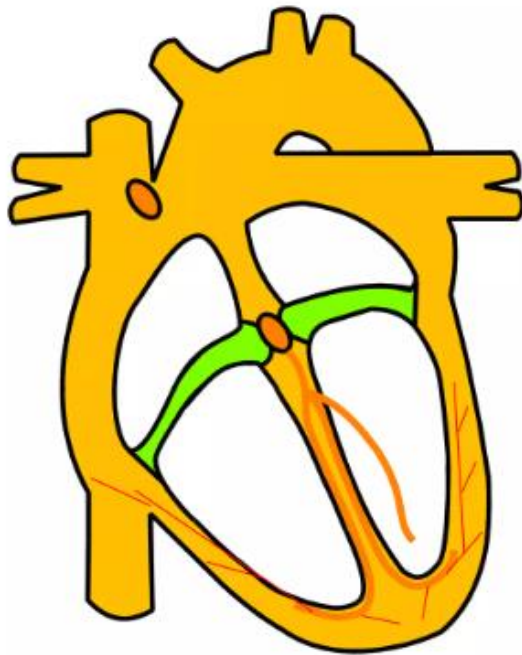
3 Lead Machine that is used to monitor.



# Session Objectives

- To be able to record a 12 lead ECG.
- To be aware of normal ECG values.
- To be able to perform a basic ECG interpretation.  
(Self Directed Element)

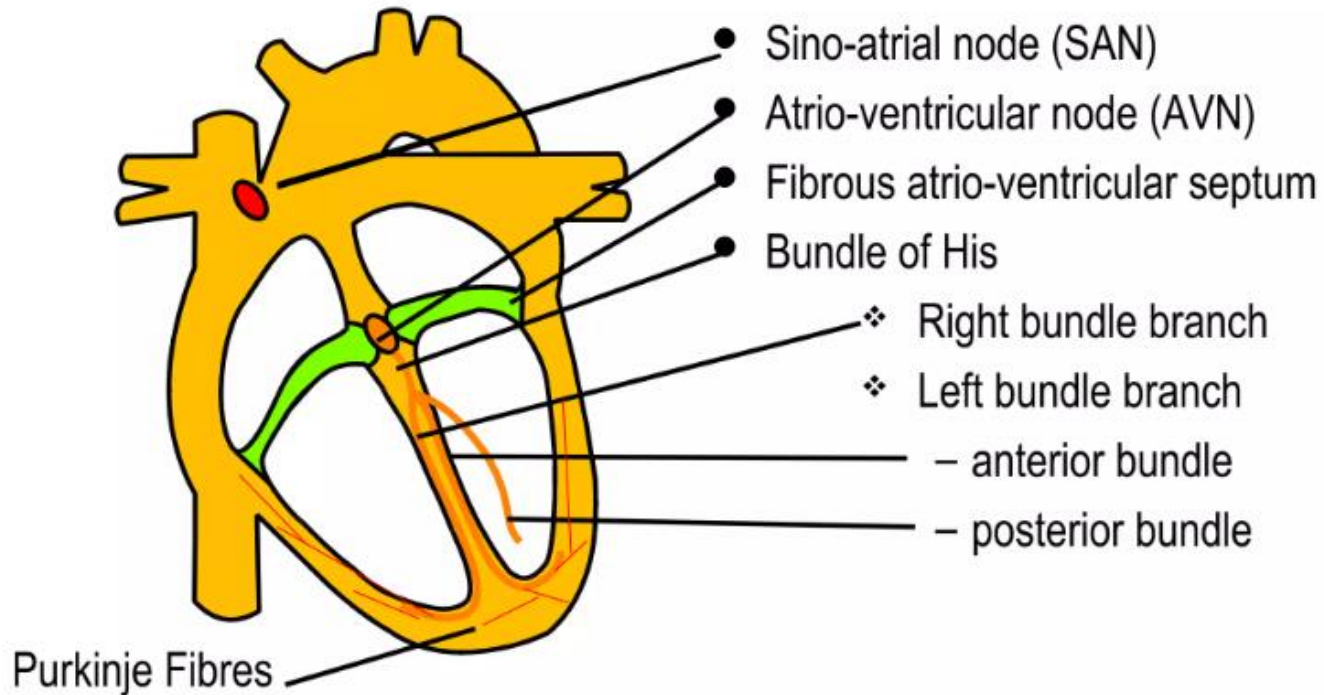
# The Heart



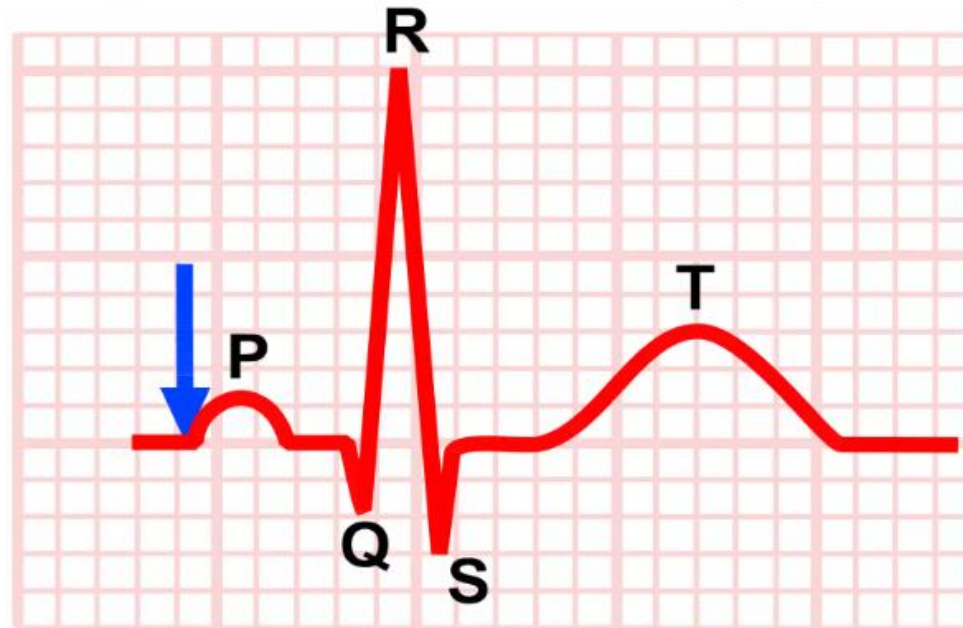
All heart muscle is capable of conducting an electrical impulse and initiating a spontaneous electrical discharge.

The 12 lead ECG is a graphical representation of this activity

## Main Structures

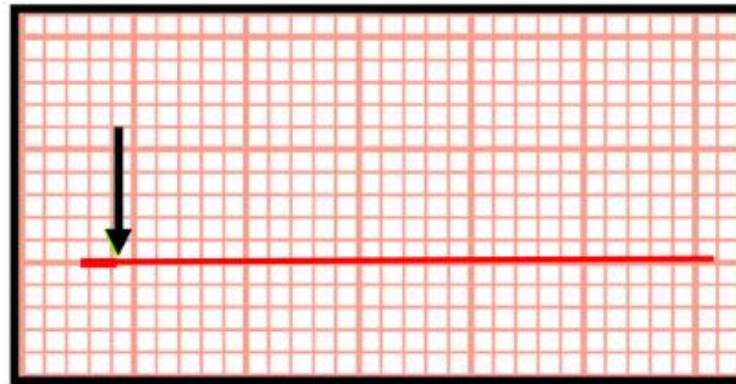


The electrical events of a single cardiac cycle and how it is represented on ECG paper.



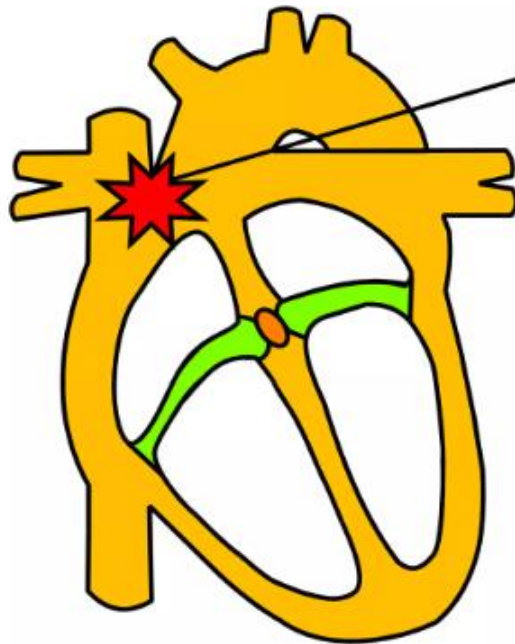


## The Iso Electrical Line

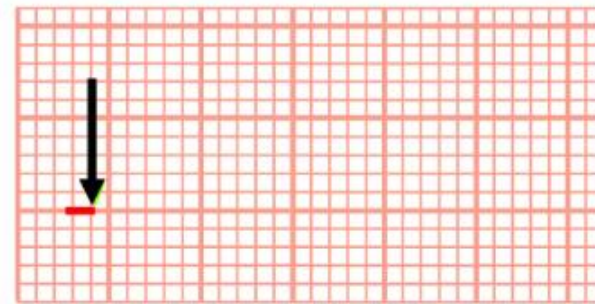


This represents the resting potential of the heart. The electrical events of the cardiac cycle will be represented by deflections away from this line.

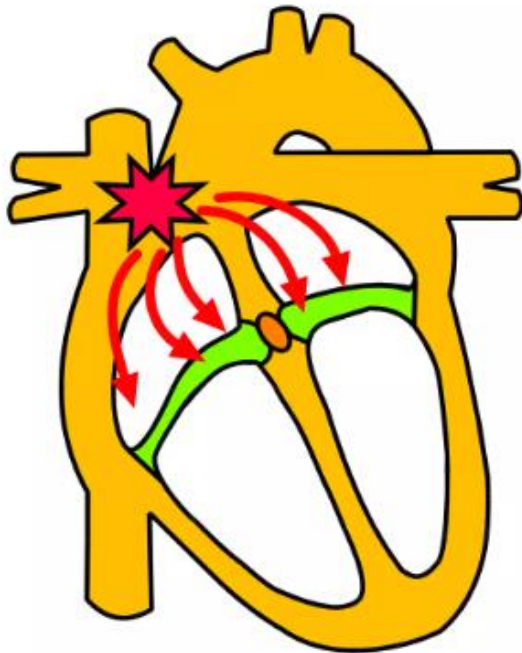
# SAN Depolarisation End of Iso Electrical Line



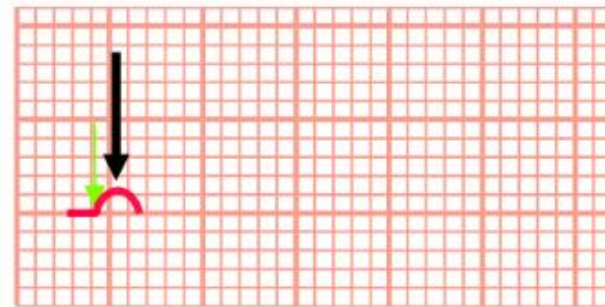
The events of the cardiac cycle are initiated by depolarisation of the sinoatrial node



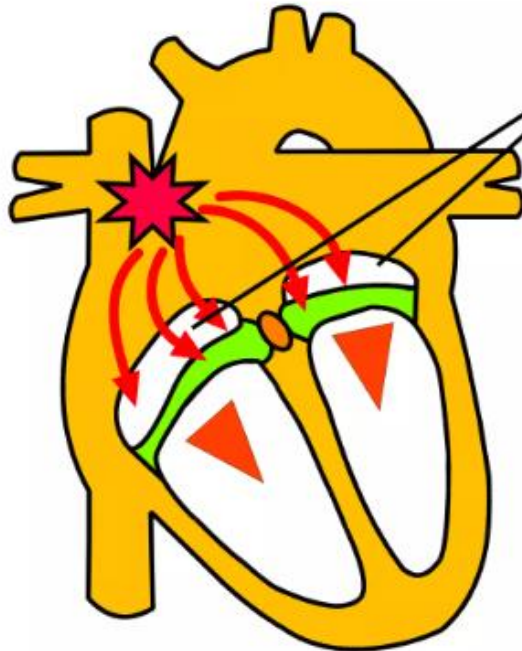
# Atrial Depolarisation (P Wave)



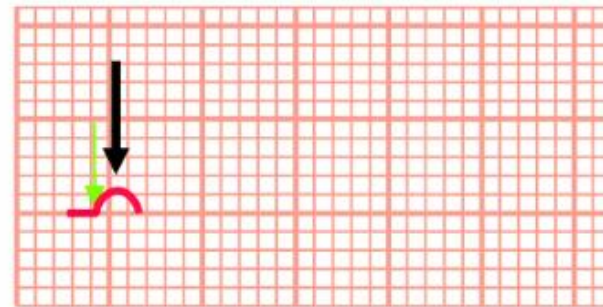
- The wave of electrical depolarisation is conducted through the cardiac muscle of both atria



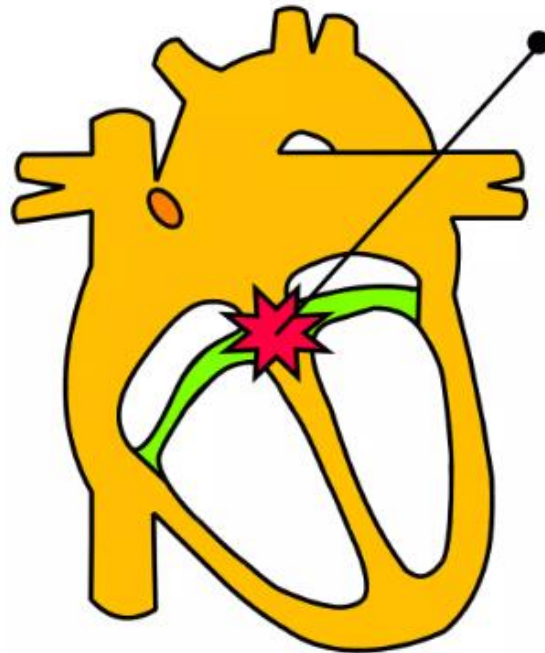
# Atrial Contraction (P Wave)



The depolarising wave causes contraction of the atria pushing blood into the ventricles



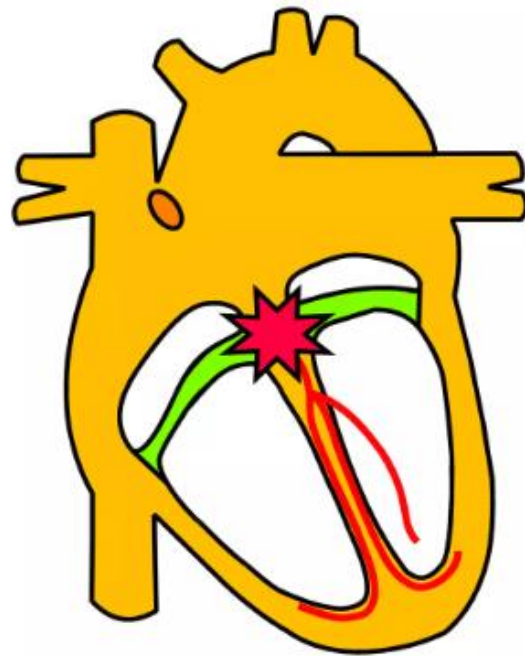
## AVN depolarisation (PR Interval)



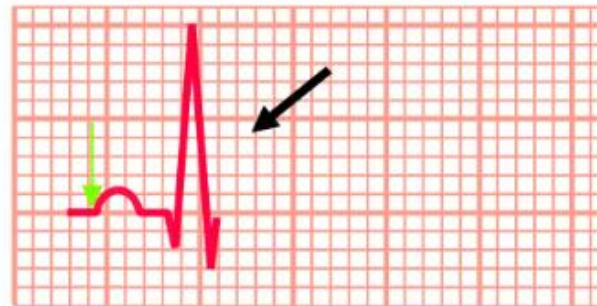
The wave of depolarisation reaches the atrio-ventricular node which depolarises and conducts, but slows the wave



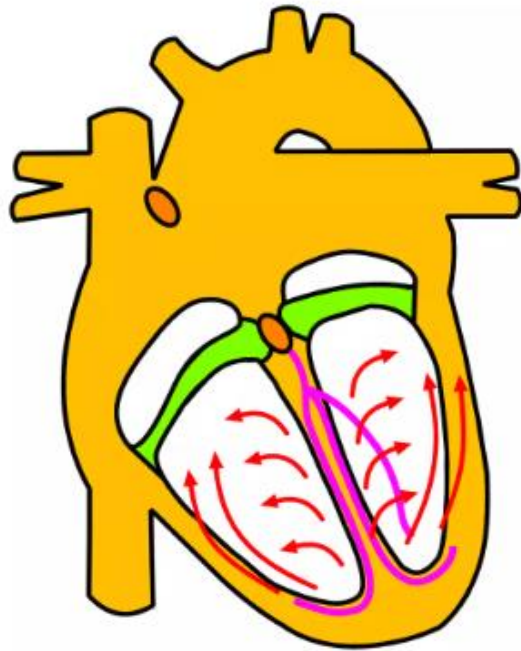
# Specialised conducting tissue (QRS Complex)



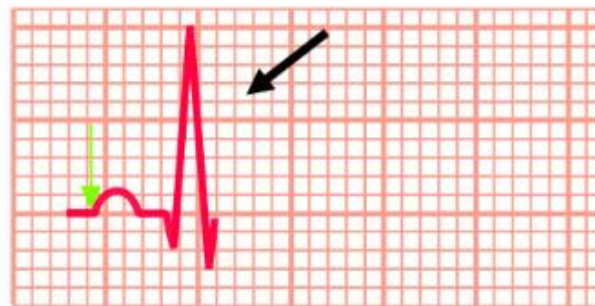
- The AVN conducts the depolarisation to the Bundle of His



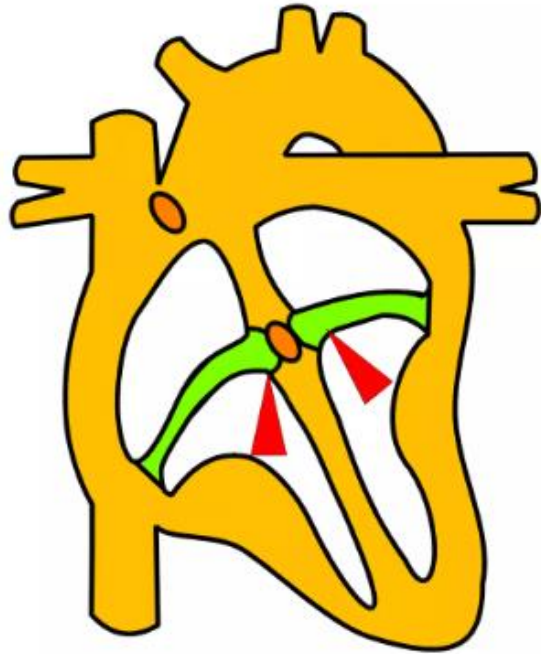
# Ventricular depolarisation (QRS Complex)



- The wave of depolarisation quickly moves through the specialised conducting tissue



# Ventricular contraction (QRS Complex)

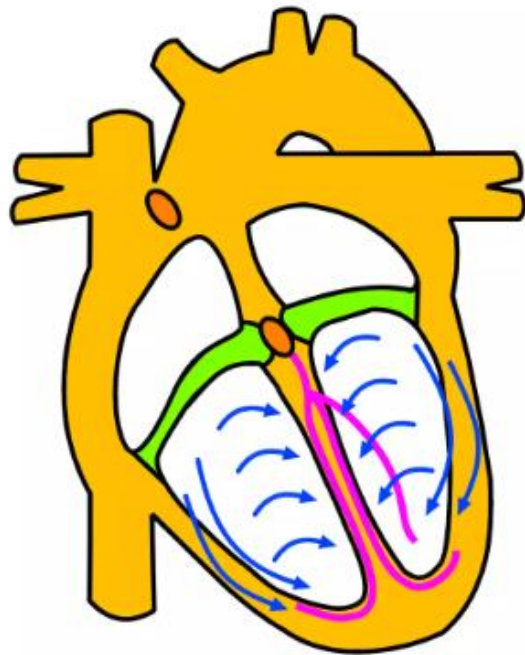


- The co-ordinated, synchronised depolarisation produces an effective contraction of both ventricles

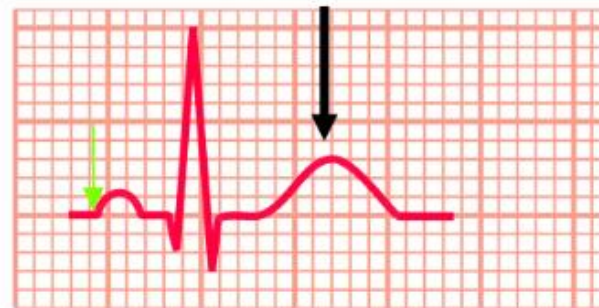




## Ventricular Repolarisation (T Wave)



- After depolarisation and contraction the ventricle repolarise, returning to the resting potential.

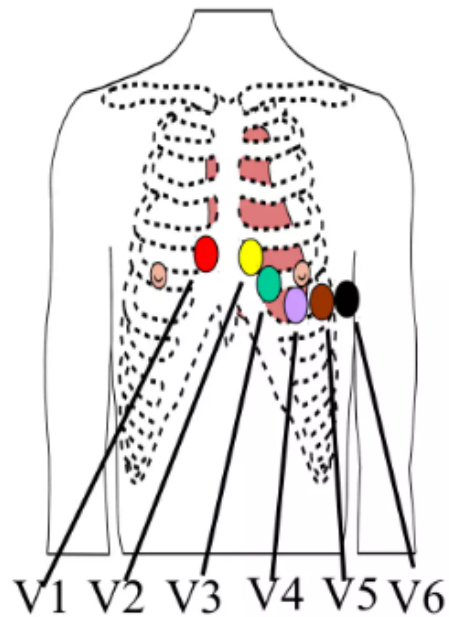




# 12 Lead ECG

- 12 views of the heart
  - 6 chest leads
  - 6 limb leads
- Only 10 wires

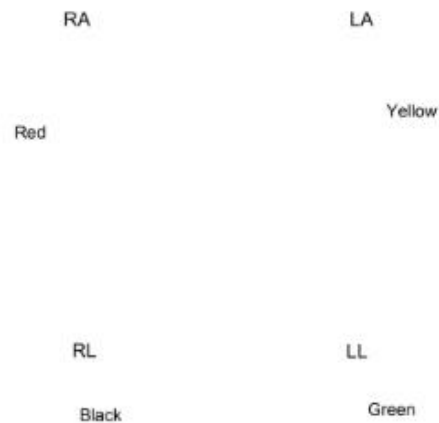
# Lead Position - Chest



- V1 - 4th ICS RSE
- V2 - 4th ICS LSE
- V3 - midway between V2 & V4
- V4 - 5th ICS MCL
- V5 - Level with V4 AAL
- V6 - Level with V4 MAL

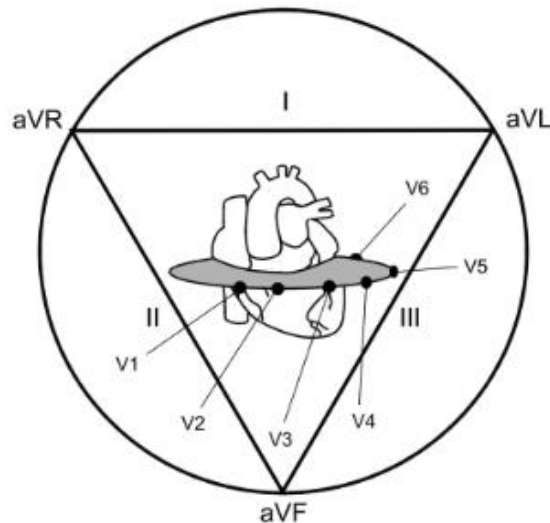
# Lead Position - Limb

## Positioning the limb leads



- Position of the electrodes for limb leads
- Right wrist  $\equiv$  aVR
- Left wrist  $\equiv$  aVL
- Left leg  $\equiv$  aVF
- Right leg (earth)

# Relationship of limb and chest leads



- The chest leads look at the heart across the horizontal plane
- The limb leads look at the heart in a vertical plane
- Leads aVR, aVL and aVF look from three separate directions
- Leads I, II and III are summation of potential differences between limb leads